

BULLETIN OF MISCELLANEOUS INFORMATION Appendix I 1929 ROYAL BOTANIC GARDENS, KEW

REVIEW OF THE WORK OF THE ROYAL BOTANIC GARDENS, KEW, DURING 1928.

General.

STAFF.—During 1928 the following changes have taken place:—Mr. W. Irving, Assistant Curator in charge of the Herbaceous and Alpine Department, retired after 38 years' service, and was succeeded by Mr. A. Edwards, from the Public Parks Department, Manchester. Dr. J. M. Cowan was appointed a Temporary Botanist in place of Miss M. B. Moss, seconded to replace Mr. J. Hutchinson during the latter's absence in South Africa. Mr. E. M. Marsden-Jones, F.L.S., has been appointed an Honorary Associate for Transplant and Breeding Experiments. Mr. C. A. Smith, B.Sc., of the Division of Botany, Department of Agriculture, Pretoria, was appointed by the Government of the Union of South Africa, Assistant for South Africa in the Herbarium at Kew, in succession to Miss I. C. Verdoorn, and entered on his duties in March.

EMPIRE MARKETING BOARD.—Having regard to the importance from an economic standpoint of a complete knowledge of the plant resources of the Empire, the Empire Marketing Board has made, through the Ministry of Agriculture and Fisheries, a grant of £2,000 to provide for the continuation of the work of making available for study the accumulations of botanical material in the Herbarium Store. In addition, a further grant of £4,000, for the year 1928-29, was made for the continuance of the special projects outlined in last year's Review (*K.B. Appx. I*, 1928, p. 2).

OFFICIAL VISITS.—The Director, as recorded in the Annual Review of last year, paid official visits to Australia and Tasmania, New Zealand, Malaya and Ceylon, during the winter and spring of 1927-28; he also visited Java and the Botanic Gardens, Buitenzorg.

He left Kew on November 3rd, 1927, and joined the Orient R.M.S. "Osterley" at Toulon on the following day, arriving at Colombo on November 19th. Here he was met by the Hon. F. A. Stockdale, and dined with His Excellency the Governor.

On arrival at Perth, Western Australia, on November 29th, the Director was met by the State Chairman and other officials of the Commonwealth Council for Scientific and Industrial Research and was the guest of His Excellency the Governor. Conferences were

held with the Botanical, Agricultural and Forestry officers, and a well-arranged tour was made in the S.E. portion of the State, in the course of which the Jarrah and Karri forests and the wheat belt around Kellerberrin were visited.

The Director took the night train from Kellerberrin to Kalgoorlie on December 5th, and visited the Sandalwood areas and plantations near Kalgoorlie.

Travelling by the Transcontinental train from Kalgoorlie on December 7th, Port Augusta was reached, after crossing the Nallarbor Plain, on the afternoon of December 9th, and from here the Director went to inspect the Koonamore Reserve with Professor T. G. B. Osborn, and arrived at Adelaide on December 12th. Here the Botanic and other gardens and the Waite Institute were visited, and the Director received the Honour of the D.Sc. degree from the University, and was entertained by the Lieut. Governor. Melbourne was reached on December 17th, the Director being met by Sir David Masson, State Chairman, and Dr. Rivett, Secretary of the C.C.S.I.R., who was so largely responsible for the excellent arrangements made for the whole Australian tour.

A Civic reception was accorded by the Lord Mayor and a reception was also given by the Royal Colonial Institute on the day of arrival, and later the Director was entertained by His Excellency the Governor. He visited the Botanic Garden, the Herbarium and the University, and made various botanical excursions before proceeding to Canberra, which was reached on December 28th. Here some time was spent under the guidance of Mr. C. E. Lane-Poole, Inspector General of Forests.

The next point to be reached was Sydney. The Director was met on arrival, on December 30th, by Professor Watt, State Chairman of the C.C.S.I.R., and Dr. Darnell Smith, Director of the Botanic Gardens. He visited the Botanic Gardens, Herbarium, Technological Museum and the University, and made excursions to the Blue Mountains with Dr. J. McLuckie, to Eucalyptus forests near Taree, to the National Park, and to La Perouse where Sir Joseph Banks first botanised in Australia.

The Director then went to Tasmania to attend the meeting of the Australian Association for the advancement of Science at Hobart. He was met on January 12th, 1928, by Mr. L. Rodway, Hon. Botanist to the Government of Tasmania, and inspected the Herbaria at the University and the Botanic Gardens. He was also able to make an expedition to the National Park near Lake Fenton (about 4,000 ft. alt.), with Mr. A. V. Giblin.

Leaving Hobart on January 17th and transshipping at Melbourne next morning, the voyage was made by the S.S. "Manuka" to New Zealand and the Bluff was reached on January 22nd.

On arrival next day at Dunedin, the Director was met by Sir James Allen and Mr. D. Tannock, Superintendent of the Botanic Garden, and others. Long visits were paid to the Botanic Garden and

other gardens, and an address was delivered at a Reception given by the Mayor of Dunedin. The public garden at Oamaru was visited with the Mayor and Superintendent on January 24th, en route for Wellington, which city was reached in the early morning of January 25th. Here the Director was met by Dr. L. Cockayne, F.R.S., Mr. E. Phillips Turner, and Dr. E. Marsden, Secretary to the Department of Scientific and Industrial Research, and later was welcomed by the principal Government officials connected with Agriculture, Forestry, etc. With the Mayor of Wellington (Mr. Troup), and others, a visit was paid to the Otari Open Air Museum and later to the Wellington water works reserve and to the Botanic Gardens. The Director was greatly honoured by being elected an Hon. Member of the New Zealand Institute during his stay at Wellington.

A Reception was also accorded the Director, at which a special Flower Show of New Zealand Alpine plants was arranged (see *Gard. Chron.* 17 Nov. 1928, pp. 388, 389).

The Director then left for Nelson with Dr. Cockayne, Mr. Phillips Turner and Mr. A. Cockayne, and on arrival, on January 27th, he visited the Cawthron Institute under the guidance of Dr. R. J. Tillyard, F.R.S., and inspected the Nelson Rock Garden and some fruit orchards. Journeying by Blenheim and Kai Koura, he saw the Forestry plantations at Hanmer and reached Christchurch in the evening of January 29th. Next morning the journey to the West Coast was made via Arthur's Pass and the Otira Gorge to Hokitika and the Franz Josef Glacier. On February 1st he ascended the mountain Aleck's Knob (4,288 ft.), with Dr. H. H. Allan, Mr. G. H. Cunningham and Mr. Alfred Cockayne, and returned to Christchurch on February 2nd, when he was received by the Mayor at the Town Hall, and delivered a lecture.

The Botanic Garden, Museum and Herbarium were inspected and a visit was paid to Riccarton Bush. The Governor General honoured the Director with an invitation to luncheon.

Auckland was reached on February 5th and a Reception was accorded by the Mayor and an Address was delivered at the University. Excursions were made to the Kauri Forests, Rangitoto Island, and other places of botanical interest, and the return journey was made via Rotorua and the Forestry plantations, Wairakei, the Tongoriro National Park, Wanganui, to New Plymouth, which was reached on February 10th. Here, after a Civic welcome and an inspection of the Public Garden and Messrs. Duncan and Davies' nursery of New Zealand plants, the Director ascended Mt. Egmont to the snow line and studied the vegetation.

He returned to Wellington via Palmerston North to see the Esplanade Gardens and the Massey Agricultural College, and some of the New Zealand Flax plantations and flax mills. Wellington was reached on February 13th, and, after visiting the Government Herbarium, with Mr. W. R. B. Oliver, and being received by Mr.

Coates, the then Prime Minister, the Director left New Zealand for Sydney on February 14th by the S.S. "Tahiti." Transshipping at Sydney to the S.S. "Orungal," he reached Brisbane on February 20th, and was met by Mr. C. T. White, Government Botanist, and Mr. E. W. Bick, Director of the Botanic Garden.

Visits were paid to the Gardens, Herbarium, Forestry Museum and the University. The Director was entertained by His Excellency the Governor, the Vice Chancellor of the University, and the Lord Mayor, and made excursions to study the vegetation near the city.

Leaving Brisbane on February 24th by the K.P.M. S.S. "Houtman," the Director reached Sourabaya, Java, on March 9th, after calling at Macassar, Celebes. He arrived at Buitenzorg on March 12th, and was the guest of Dr. Docters van Leeuwen, Director of the Botanic Gardens. The Gardens, Herbarium, Museums, and the various scientific Institutes in Buitenzorg were visited and an excursion was made to the Mountain garden at Tjibodas and to Mt. Gede.

Leaving Java by the S.S. "Op ten Noort" the Director landed at Singapore on March 19th, and was the guest of His Excellency the Governor during his stay. After visiting the Botanic Gardens with the Director, the Herbarium and the Raffles Museum, the journey was resumed by night train to Kuala Lumpur in order to see the work of the Agricultural Department at Kuala Lumpur, Serdang, Klang and Krian. The Acting Director of Agriculture and the Officers of the Department afforded the Director the fullest opportunities of inspecting the various activities of the Department, and visits were also paid to the Forestry Museum and to the Rubber Research Institute.

Penang was reached on March 22nd, and, after inspecting the Waterfall Gardens with the Assistant Curator, the Director resumed his homeward journey by the P. & O. S.S. "Kashmir" on March 24th for Ceylon. On arrival at Ceylon on March 28th, he was taken by Mr. Stockdale to Peradeniya and Kandy, via Heneratgoda and Kegalle Experiment Station, and at Kandy and later at Nuwara Eliya he was the guest of His Excellency the Governor. During the stay at Peradeniya, the Botanic Gardens, Herbarium, the Research Laboratories and the Experiment Station were visited, and conferences were held with the Director of Agriculture and the scientific officers of his staff.

At Nuwara Eliya, a visit was paid to the Tea Research Institute, after which the return to Colombo was made via the Hakgala Botanic Garden, Craig tea estate and the Rubber Research laboratories at Culloden. At Colombo the Director visited the botanical department at University College with Professor N. Ball.

He left Colombo on April 4th by the Orient R.M.S. "Ormonde," arriving at Toulon on April 20th, and Kew on April 21st, 1928.

The Assistant Director undertook a mission to Cyprus and to the Sudan at the request of the respective Governments and with the

concurrence of the Empire Marketing Board and the Ministry. He left Kew for Cyprus on November 3rd, 1928, to report on botanical and agricultural matters in the Island, in particular with reference to Citrus growing, which will entail a visit to Sicily on the return journey.

Khartoum was reached on December 6th, after a visit had been paid to the Horticultural Department, Egypt, on the kind invitation of the Egyptian Government. In the Sudan the Assistant Director has been asked to advise and report on various horticultural and forestry matters, and for this purpose an extensive tour has been arranged to enable him to inspect large tracts of interesting country.

At the request of the Governor of British Honduras, and with the concurrence of the Empire Marketing Board, the Economic Botanist, Mr. H. C. Sampson, paid a visit to that Colony to report on the prospects of Agriculture and the means by which agricultural development might be fostered by the local Government. He left England on July 26th and returned to this country on November 7th. As far as time permitted, he visited all accessible parts of the Colony. A report on his tour has been submitted to the Secretary of State for the Colonies, and has been published by the Empire Marketing Board.

Mr. J. Hutchinson, Assistant in the Herbarium, left Kew on July 28th, 1928, to undertake a collecting tour in the Union of South Africa, on the invitation of the Botanical Authorities of the Union and with the concurrence of the Empire Marketing Board and the Ministry. After an extensive tour in the Karroo with officers of the Botanical Survey of the Union, Mr. Hutchinson proceeded by Grahamstown and Natal to Pretoria, where Dr. I. B. Pole-Evans made arrangements for the continuation of his tour.

Through the kindness of General the Rt. Hon. J. C. Smuts, Mr. Hutchinson accompanied him on a tour in the Zoutspansberg Division as far as the River Limpopo. Mr. Hutchinson will be returning to Kew in March.

As a result of the tour, Kew has already received very interesting living collections of South African succulent plants, which are now being cultivated in the succulent pits.

In continuation of a tour commenced towards the end of 1927, Mr. F. N. Howes, Assistant, Museums, visited several Eastern countries during the earlier portion of the year in connection with investigations on bananas that are being carried out by the Empire Marketing Board. The countries visited were Malaya, Java, Siam, Burma, S. India and Ceylon. The chief object of the tour was to obtain a representative collection of the better types of edible bananas (potential shipping types) occurring in these regions, but, in addition, material of the larger-fingered seeding Musas was obtained. It is hoped these may prove to be of service in the banana breeding work

that is being carried on in the West Indies. This work is further referred to on p. 7.

As the selection of seedless and seeding bananas in the East involved a survey of all the varieties occurring in the areas visited, this afforded good opportunity for making a special study of varieties and their distribution. A full account of this feature of the work has been published (*K.B.* 1928, p. 305).

Mr. T. W. Taylor, Assistant Curator, Tropical Department, completed his visit to the Far East for the purpose of studying tropical plants in their native homes and to see the collections in Botanic Gardens. Visits were made to the Botanic Gardens of Penang, Singapore, Buitenzorg, Tjibodas, Peradeniya, Hakgala and Heneratgoda. The Public Gardens at Kuala Lumpur and Taiping were also visited, and excursions were made to the summit of Maxwell's Hill and Fraser's Hill in Malaya and to Mt. Gede in Java for the purpose of studying the mountain flora.

The foregoing visits were in connection with the grant from the Empire Marketing Board for overseas missions.

In addition the following visits were undertaken by members of the staff during the year.

On the invitation of the Charles University, Prague, the Director delivered three lectures at the University in October. The opportunity was taken to visit, on the return journey, the Botanic Garden and Botanical Institute at Munich, under the kind guidance of Professor Goebel, who presented several plants of interest to Kew. Visits were also paid to Dr. J. P. Lotsy at Velp, Holland, with whom hybridisation questions were discussed, to Professor F. A. F. C. Went at Utrecht, where the Botanic Garden and Institute were inspected, and to the splendid Colonial Museum at Amsterdam under the guidance of Professor de Bussy.

At the request of the Delville Wood Memorial Committee, and by arrangement with the Imperial War Graves Commission, the Assistant Director and Mr. Dallimore, Keeper of the Museums, visited France to report on the condition of Delville Wood, which is being maintained as the South African War Memorial, and to advise as to its future management. A second visit was paid later by Mr. Dallimore to report on the progress of the work.

The Keeper of the Museums attended the Annual Meeting of the Royal English Arboricultural Society at Inverness in August.

Mr. J. H. Holland, Assistant, Museums, attended the meeting of the Museums Association at Glasgow in July.

Mr. C. P. Raffill, Assistant Curator, Temperate Department, visited the Royal Botanic Garden, Edinburgh, and several of the more important gardens in the west and south-west of Scotland.

ADVISORY WORK.—The Director has been appointed President of the Imperial Botanical Conference to be held in London in 1930

immediately before the International Botanical Congress in Cambridge. He is also Chairman of the Sub-Committee dealing with Taxonomy and Nomenclature, with Mr. Cotton as Secretary.

The Assistant Director has been appointed one of the Secretaries of the International Botanical Congress.

Mr. H. C. Sampson represented the Government of India on the Financial Supervisory Body which has been set up to consider the establishment of Agricultural Bureaux and Correspondence Centres as recommended by the Imperial Agricultural Conference held in October, 1927.

In connection with the work of the Imperial Institute Advisory Committees on Plant Products, a collection has been made of the different races of *Acacia arabica* with the object of ascertaining by analyses their varying tannin content and of ultimately testing these races under cultivation both in the Sudan and in India. Seeds of Algarobilla (*Caesalpinia brevifolia*), and of Quebracho (*Schinopsis Balansae* and *Schinopsis Lorentzii*), have also been secured and distributed. With the funds made available from the Empire Marketing Board's grant, it has been possible to finance the purchase of a large quantity of the fruits of the Tung Oil plant, *Aleurites Fordii* and *Aleurites montana*. These fruits will be distributed to various parts of the Empire for trial cultivation.

OTHER ECONOMIC ACTIVITIES.—A large consignment of seeds of agricultural crops likely to prove useful has been obtained and forwarded to the Agricultural Department of British Guiana. Varieties of groundnut (*Arachis hypogaea*) from Central and South America have been obtained and forwarded to the Mycologist at the Durban Herbarium, who required the material for his research work on the "rosette" disease of groundnuts. Suckers from the species and varieties of bananas, collected last year in the East by Mr. F. N. Howes, have been despatched as they have become ready to the Imperial College of Tropical Agriculture, Trinidad, from the quarantine house at Kew. These are for the plant breeding work being carried on there with a view to producing a suitable banana which may be immune to "Panama disease."

Steps have been taken to procure herbarium specimens of and agricultural information on the cultivated varieties of *Sorghum* from all parts of the Empire, with a view to working out their classification and the distribution of the several species.

PUBLICATIONS.—Ten numbers of the *Kew Bulletin*, and three Appendices, were published during 1928.

A new edition of the Popular Official Guide, mentioned in *K.B.* Appx. I, 1928, was published in March, and a new edition of the Guide to Museum II appeared in the Autumn. Other publications are mentioned on pp. 25, 28-41.

THE ASSOCIATION OF ECONOMIC BIOLOGISTS.—The Association visited the Herbarium and Gardens on May 11th. Amongst the

exhibits placed on view in the Herbarium were a series of Chaulmoogra Oil plants, Sorghums, East African pasture grasses, Tropical African poisonous plants and various South African plants of economic importance.

COURSES OF INSTRUCTION.—As in previous years, special courses were arranged, at the request of the Secretary of State for the Colonies, for probationers and officers of scientific departments in the Colonies.

The Gardens.

VISITORS.—The number of visitors to the Gardens in 1928 was 1,127,003, an increase of 48,915 on the figures of the preceding year. The greatest monthly attendance was in May with 229,210, the smallest being in December with 6,564. The highest daily attendance was 53,661 on Whit Monday, May 28th, and the lowest 7, on December 18th.

PLANT HOUSES.—The chief structural alteration made during the year was the enlargement of the annex to the Victoria Regia house (No. 10) in which the collection of insectivorous plants is shown to the public. The old annex was pulled down and replaced by a larger "lean-to" structure with the roof considerably lower; it is 50 feet long, 8 feet wide and 9 feet high. A stage 3 feet 6 inches wide is provided for the plants. The collection of insectivorous plants was very much injured by the sea-water episode of 1921 (see *K.B.* 1922, p. 1), the *Sarracenias* being almost entirely killed off. By means of gifts from other Botanic Gardens at home and abroad and by purchase, a good collection of *Sarracenias* has been got together again, although the plants are still small. The collection of *Droseras* made a particularly striking display during the summer, and several specimens of the Australian climbing species, *Drosera penicillaris*, are now in cultivation. A fine batch of the rare and not easily grown *Cephalotus follicularis* from S.W. Australia was on view throughout the year. We have also been able to secure again *Heliamphora nutans*, thanks to the kindness of the Regius Keeper of the Royal Botanic Garden, Edinburgh, and the interesting *Drosophyllum lusitanicum* from Portugal, as well as *Darlingtonia californica* from N.W. America. An excellent group of the Venus' Fly-trap (*Dionaea muscipula*)—a plant of very great interest to the general public—may also be mentioned. Judging by one season's experience, this new house is a great improvement on the old one from a cultural point of view—an improvement due, no doubt, to its lower elevation, which brings the plants nearer the glass and enables a much moister atmosphere to be maintained, both matters of the first importance in the cultivation of this group of plants.

Temperate House.—The large central block of the Temperate House has been repainted. Owing to an ingenious system of scaffolding used by the contractor, the work was completed in a

much shorter time than ever before. A word of acknowledgment is due to those concerned for the care they took, which resulted in a minimum of injury to the plants and very little inconvenience to the public and the Gardens Staff.

Frequenterers of this house will remember that perhaps the most conspicuous feature there for many years has been a pair of Bunya-Bunya pines, *Araucaria Bidwillii*, native of Australia. They were planted soon after the completion of the building of this section in 1862. The tree planted in the southern half of the house has been failing for some years past, this being due mainly to its age. It reached the top of the house many years ago and since then has had to have its top cut off periodically. In recent years the lower branches continued to die off and it seemed desirable to replace it whilst the companion tree in the northern part of the house remained in its present fine condition. It was accordingly taken down during the summer, the soil in the bed renewed, and a healthy young tree of the same species planted in its place. In this way it is hoped that a feature of the house which has become almost traditional may be preserved.

Chinese Rhododendron House.—The plants in this house (part of the Temperate House Group) have mostly grown well during the year and have, in general, a very healthy appearance. Many of them are too young to have reached the flowering stage, but nearly sixty species blossomed during the season, commencing in January with a fine white form of the variable *R. irroratum*. The following is a list of the more uncommon and interesting species and hybrids that flowered:—*aureum*, *Bachii*, *bullatum*, *burmanicum*, *callimorphum*, *carneum*, *chaetomallum*, *ciliicalyx* x *moupinense*, *coriaceum*, *didymum*, *erigynum*, *euchaites*, *facetum*, *floccigerum*, *glischrum*, *Griersonianum*, *Jenestierianum*, *keleticum*, *laxiflorum*, *leptothrium*, *litiense*, *Mackenzianum*, *megacalyx*, *mollicomum*, *Morii*, *moupinense* x *carneum*, *odoriferum*, *salignum*, *saluenense*, *Scottianum*, *sperabile*, *stenoplastum*, *stereophyllum*, *Wardii*, *Wilsonae*, F. No. 21706 sp. nov.

Tropical Fernery.—The transept of this house (No. 2), as originally built, was occupied by two central stages (between which ran a path from the doors to the centre of the house) and two side stages attached to the walls. The central stages and the central path have been cleared away and their place is now taken by a rectangular bed of soil raised about two feet above ground level and held in place by an informal arrangement of stones. In this the ferns, which were previously grown in pots on the stages, have been planted. Some very fine tropical tree ferns constitute the chief feature, and since they have been brought down nearer eye-level and provided with more head room, their remarkable beauty can be much more readily appreciated. Beneath them, and forming a ground cover, are the dwarf ferns and some other ornamental stove plants which would be found as normal undergrowth in a Tropical forest. All the plants have taken readily to the new soil and grew vigorously during the summer.

Some of the Epiphytic ferns have also been fixed to curved tree branches spanning the side paths, in order to show the manner in which such ferns grow in their native habitats.

Palm House.—A small porch or lobby has been erected at the north-west entrance. Its object is to prevent the inrush of cold air, especially during a north wind, every time the door is opened. This happens more particularly on bright Sundays in early spring, when there is an almost constant succession of visitors entering the house at this end. The porch is built of iron and is of a neat design according well with the main structure. The inner main doors have also been reduced in height in order to lessen the size of the door opening and so minimise the admission of cold air.

BROAD WALK.—Visitors to Kew will remember that the sequence of Rhododendron groups along the Broad Walk, each with a rectangular bed in front of it for spring and summer bedding plants, was broken about midway, near the noble Turkey Oak, by a "horse-shoe" shaped arrangement of the paths at each side. The two curving paths which made the "horse-shoe" on the south-west side have been abolished and replaced by a single path made in continuation of that which leads from the Brentford Ferry Gate and the Rhododendron Dell. This alteration has provided space for four additional groups of Rhododendrons, each with its rectangular bed in front, so that now a continuous and practically uniform arrangement prevails throughout the entire length of this fine walk.

"A SOWER."—A presentation of great interest has been made to Kew, by the Royal Academy, of the statue of "A Sower" by the late Sir Hamo Thornycroft, R.A. This has been erected at the northern end of the Broad Walk on a pedestal designed by Sir Edwin Lutyens, R.A., and Mr. A. Drury, R.A.

ROSES.—The collection of dwarf Polyantha roses that occupied a group of beds on the south-west side of the Broad Walk was removed last autumn to the Palm House terrace, where twelve new beds have been prepared and planted. They now form part of the general collection of garden roses, situated mostly on the south-west side of the Palm House, which consists at present of 113 beds, each devoted to a single variety, and comprising altogether nearly 7,000 plants. The new beds were cut out of the lawn on the terrace and, to provide an additional setting of turf, the gravel path round the Palm House was reduced in width from ten feet to eight feet.

Neither the climate nor the general conditions prevailing at Kew can be regarded as altogether favourable for the garden varieties of roses, but the collection is now probably as large and representative as that of any public garden in the British Isles, including as it does Hybrid Perpetuals, Teas, Hybrid Teas, Bourbons, Musk Hybrids and dwarf Polyanthas. It certainly helps the multitude of rose lovers whose gardens are situated within the London smoke area to judge what varieties are likely to succeed best there.

A considerable renovation of the collection of Rambler roses in the little dell near the Pagoda was effected by some 500 new plants being put out there.

Kew was visited by the National Rose Society on July 3rd, during the International Rose Conference.

TREES AND SHRUBS.—During the great storm of Friday, November 16th, the magnificent elm standing on the lawn near the Broad Walk (Key Plan E.9) was blown down. This tree was probably the tallest in the Gardens and, being isolated sufficiently to be viewed from every side, it made much the most conspicuous feature in its particular area, and its disappearance is greatly to be regretted. As it lay on the ground it measured almost exactly 100 feet in length; its girth at the base was 18 feet; at 3 feet high, 16 feet. Except for the large Sweet Chestnut in the Spruce collection, which has a girth of 22 feet 9 inches at three feet from the ground, it had the largest trunk of any tree in Kew. The number of annual rings was about one hundred and ninety, which shows that the tree was planted some time during the regime of Frederick, Prince of Wales (1730-1751). It grew very quickly as a young tree, the annual rings at one time varying in width from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch.

This Elm and most of those growing at the Northern end of the Gardens were originally planted on mounds of earth evidently made specially for them, the idea being, no doubt, to relieve the naturally monotonous level of Kew. The one on which this elm stood has been planted with varieties of Japanese Cherries (*Prunus Lannesiana* and *P. serrulata*), many beautiful varieties of which have been introduced in recent years. A specimen of *Fagus sylvatica* var. *rotundifolia*, a distinct and attractive variety which originated at Knaphill, Woking, about 60 years ago, has been planted in the centre.

Early in the year, on February 10th and 11th, a storm brought down two large elms on the shaft yard side of the pond, and a third was so much injured by their fall that it had to be taken down also. They were not particularly fine trees, but their loss is to be regretted because they helped to shut out the view of the villas in the Kew Road from the Gardens. This is a matter of some concern, as it has always been an object steadily kept in view to block out as much as possible the sight of the houses which have sprung up in such great numbers during recent decades on this side of the Gardens. A group of Lombardy poplars planted on the site of the elms will, it is hoped, in a comparatively short time fulfil the purpose they did.

The border of shrubs extending from the Cumberland Gate to No. 1 Museum has been overhauled. For very many years past the front of this shrubbery has been occupied by a sloping bank of clipped laurel, the last representation in Kew of a use of the common laurel which, forty or fifty years ago, was very frequent in the Gardens as in other establishments. The pronounced success of the varieties of common Camellia (*C. japonica*) in the open air at

Kew suggested that a more extended use might be made of them here. Some sixty plants have therefore been collected and are now distributed along this shrubbery. Many of them are still quite small, but, if they succeed, they will eventually provide a distinctive feature. The one defect of the *Camellia* as a flowering shrub for the open air is the liability of its flowers to injury by late spring frosts. On this site the plants will at any rate be shielded from the rays of the morning sun.

HERBACEOUS GROUND.—The renovation of the beds devoted to plants arranged in their Natural Families has been continued. It consists of trenching the ground and replacing worn-out soil by fresh loam and fertilizers. Two more winter seasons' work will probably be required to complete this task, which was commenced in the autumn of 1926.

BIRDS.—The collection of ornamental waterfowl has been well maintained during the past year, but only among the geese were many young birds reared. Some thirteen Magellan or Upland geese and twelve Bar-headed geese were reared, and the majority were exchanged for other birds. A pair of Storks was presented by the Zoological Society, and Kew is also greatly indebted to Mr. W. H. St. Quintin of Scampston Hall, Yorkshire, for a pair of green-winged Teal (*Querquedula carolinensis*), a pair of American Redhead ducks, and four hybrid drakes between the American Wigeon male and Falcated Teal female. A pair of black East Indian ducks was presented by Mrs. Digby of Colchester. The retirement of the Bird-keeper, Mr. T. Raggett, who had been in charge of the birds for twenty-seven years, took place during the year, and as it was due to his intimate knowledge of the birds and their ways that our collections have been maintained at so high a level, his loss is much to be regretted.

ITEMS OF SPECIAL INTEREST.—Amongst interesting plants that have flowered during 1928 the following may be mentioned:—*Luculia Pinciana*, a species much rarer and less well-known than *L. gratissima*. Both are Himalayan, but *L. Pinciana* is well distinguished by five pairs of tubercles set in a circle near the throat of the corolla. It flowered in the Mexican section of the Temperate House during December and as that month was comparatively free from fogs the flowers remained in good condition for several weeks. This small tree is by no means a new one, for it was figured in the *Botanical Magazine* as long ago as 1845, but it seems never to have secured a permanent footing in gardens as *L. gratissima* has done. It is quite as beautiful as that species and the fragrance of the flowers is equally attractive.

Baikiaea insignis, the remarkable tree from Tropical West Africa, first flowered at Kew in July, 1914, and has done so on several occasions since, but never has it borne such a wealth of blossom as during 1928. It is grown in the Aroid House (No. 1)

near the Main Gate. The flowers are trumpet-shaped, up to eight inches long with a diameter of six inches, the broad petals being five in number, four white and one yellow. The tree was first found by Gustav Mann on the island of Fernando Po in 1863.

The flowering (and consequent loss) of a number of large Agaves during 1927 was noted in the preceding *Review*. Plants of *A. americana* and *A. Ixtli* flowered during 1928; the former can fairly easily be spared, but *A. Ixtli*, one of the Mexican fibre-producing species, is of more value.

A plant of *Thea* (*Camellia*) *speciosa* Pitard, raised from a cutting presented by Mr. J. C. Williams, flowered quite freely towards the end of the year. It is a native of Yunnan, China, and is an ever-green shrub with the leaves narrowly oval, very finely toothed, 2 to 3 inches long, 1 inch wide, and of a very dark green. The flower is 3 inches in diameter, the broad, emarginate petals being of a beautiful soft pink.

In the valuable collection of South African bulbs and seeds obtained through the kindness of Capt. Collingwood Ingram of Benenden Grange, Kent, perhaps the most interesting of the plants raised was *Monsonia speciosa* Sweet. It flowered during the autumn. The species was figured by Sweet in his *Geraniaceae*, vol. i. tab. 77, where he states that "this beautiful and distinct genus was named in the honour of Lady Anne Monson, a great promoter of Natural History and of botany in particular." The reappearance of this *Monsonia* is of especial interest, for it is difficult to say how long it is since the genus was represented in cultivation in this country; it can scarcely be less than one hundred years.

Another interesting plant raised from Capt. Ingram's seeds was *Kniphofia Galpinii* Baker; several plants produced their orange-coloured flowers during late summer. The species is quite new to cultivation.

An event unprecedented within living memory was the overflowing of the Thames on the night of January 6-7th, which resulted in the dwelling houses on the eastern side of Kew Green and the adjoining streets being flooded to a depth of several feet. The basement of the official residence of the Keeper of the Museums was flooded, but that was the only dwelling attached to the Gardens at all affected. The Herbarium cellars escaped by a few inches. A considerable area in the Queen's Cottage grounds was flooded but no real damage occurred.

A Sundial has been erected in the centre of the small medicinal garden at the east end of No. IV. Museum. It is chiefly of interest because the pedestal is formed of one of the stone balusters of Old Kew Bridge, which was demolished and replaced by the present one between 1899 and 1903. The baluster was presented by Mr. George Hubbard of Eltham, who resided at one time at Kew. The water-colour drawings of the Gardens made by his mother, which he has lent to Kew, are exhibited in Kew Palace (*see K.B.* 1927, p. 401).

The Fire Station in the Kew Road, close to the Curator's Office, was abandoned during 1928 by the Richmond Corporation. The ground on which it was built was lent by the Government, to whom it has now reverted. The building consisted of a shed and a stable which have been converted into store rooms, one of them for timber in process of preparation for the Museums Department.

The Flagstaff has received a protective dressing following a thorough scraping and filling up of crevices caused by the drying and shrinking of the wood. This treatment is given to prevent the entrance of moisture and is repeated every three years.

RAINFALL RECORD.

Rainfall recorded at the Royal Botanic Gardens, Kew, during 1928.

Inches.			Inches.		
January	...	2·97	July	...	2·34
February	...	1·95	August	...	2·72
March	...	1·82	September	...	0·97
April	...	1·33	October	...	3·85
May	...	1·92	November	...	1·90
June	...	2·32	December	...	2·35
Total 26·44 inches.					

The total for 1927 was 33·21 inches.

CONTRIBUTIONS TO GARDENS, 1928.—Acknowledgment has again to be made to Major Lionel de Rothschild for his great generosity to the establishment. During the past year he presented 156 packets of seeds collected by Capt. F. Kingdon Ward during his last expedition to the Far East, so that Kew has participated to a very full extent in the results of this enterprise without any cost to the public funds. Lord Bledisloe sent from his garden at Lydney Park, Gloucestershire, a very fine orange tree which has been placed in the North Octagon of the Temperate House. It is said to be about 250 years old. In April, two Mexican Mamillarias—*M. elegans* and *M. compressa*—were received from Mr. W. Hertrich of Huntingdon, San Marino, California. They are probably the finest examples of Mamillaria ever seen in this country. *M. elegans* consists of a clustered mass of about eighty stems and is eighteen inches in diameter; whilst *M. compressa* is even larger, being made up of over one hundred stems that form a compact mass twenty inches wide and one foot high. Both these plants were figured in the "Gardeners' Chronicle," July 7th, 1928, figures 3 and 4.

The Donard Nursery Co. presented over 3,000 bulbs of named daffodils for planting in grass.

Several consignments of rare and interesting succulent plants and bulbs have recently been received from Mr. J. Hutchinson, a member of the staff, who is making an official collecting tour in South Africa. Many of the succulents were collected in the Karroo desert and they include some interesting species of *Euphorbia*, *Crassula*, *Othonna* and

Mesembryanthemum. The bulbous plants include species of *Lachenalia*, *Babiana*, *Homeria* and several others unnamed.

During the year 911 separate consignments of living plants, seeds, etc., were contributed to the Gardens. This represents an increase of 61 on the number of contributions in 1927 and constitutes a record in the history of the establishment. The more important donations were as follows :—

Public Institutions :—

Aberdeen, Cruickshank Botanic Garden.—Plants including *Begonia* spp., *Sonerila Nisbetiana*, *Solanum Sanitwongsei*, etc.

Arnold Arboretum, Jamaica Plain, Mass., U.S.A.—Seeds of trees and shrubs.

Bangkok, Siam, Department of Agriculture.—*Musa* spp. and native varieties.

Belgrade Botanic Garden, Serbia.—35 packets of seeds.

Bermuda, Department of Agriculture.—Miscellaneous seeds and bulbs of *Lilium Harrisii*.

Bonn Botanic Gardens, Germany.—95 packets of seeds.

Buitenzorg Botanic Garden, Java.—130 packets of seeds ; plants of *Musa* spp., *Dendrobium* spp., and *Hydnophytum formicarium*.

Dar-es-Salaam, Tanganyika Territory, Department of Agriculture.—Plants and seeds, including *Adenium coetaneum*, *Thespesia macrophylla*, *Ixora* sp., etc.

Darjeeling, Lloyd Botanic Garden.—352 packets of seeds.

Darwin Botanic Gardens, Western Australia.—Seeds of *Pandanus Whitei*.

Dehra Dun, U.P., India, Forest Research Institute.—Miscellaneous seeds.

Dunedin Botanic Garden, New Zealand.—213 packets of seeds.

Edinburgh, Royal Botanic Garden.—74 packets of seeds, and plants of *Sarracenia* spp., *Ipomoea muricoides*, etc.

Glasnevin Botanic Gardens, Dublin.—A collection of *Sarracenia* spp.

Georgetown, Demerara, Department of Agriculture.—Fruits of *Lodoicea sechellarum*.

Hyde Park.—Collections of plants and seeds of bedding, greenhouse and decorative plants, and 116 packets of seeds collected in Nepal. Plants of *Primula reptans*, etc.

Imperial Institute, South Kensington.—Seeds of economic plants, including *Aleurites Fordii*.

Jamaica, Department of Agriculture.—Collection of Bromeliads, orchids and plants of *Agave Morrisii*.

Kirstenbosch, S. Africa, National Botanic Gardens.—Bulbs and seeds of South African plants.

Kuala Lumpur, F.M.S., Department of Agriculture.—*Musa* spp.

Lisbon Botanic Garden, Portugal.—42 packets of seeds, and tubers of *Oxalis cernua*.

Madagascar, Department of Agriculture.—A collection of orchids.

- Majorca, Spanish Government Tree and Fruit Culture Station.—
Grafts of four varieties of cultivated Almonds.
- Maymyo, Burma, Government Botanic Gardens.—A collection of orchids.
- Melbourne Botanic Gardens; Australia.—25 packets of seeds.
- Missouri Botanic Gardens, St. Louis, U.S.A.—*Nymphaeas*.
- Montpellier Botanic Gardens, France.—50 packets of seeds.
- Munich Botanic Gardens, Bavaria.—Plants including *Sarracenia Courtii*, *Drynaria Fortunei*, *Photinopteris speciosa*, and *Platy-cerium* sp.
- Nantes Botanic Gardens, France.—45 packets of seeds.
- New Zealand (Nelson) Alpine and Rock Garden Society.—60 packets of seeds.
- Peradeniya, Ceylon, Royal Botanic Gardens.—Seeds of *Corypha umbraculifera*.
- Prague Botanic Gardens, Czechoslovakia.—Cuttings of *Ginkgo biloba* var. *pendula*.
- Singapore Botanic Gardens, Straits Settlements.—Plants and seeds, including *Impatiens oncidoides*, *Heliconia aurea*, etc.
- Taronga Zoo Park, Sydney, Australia.—Seeds of *Acacia Sophorae*.
- Tokyo, Japan, Botanic Garden of the Imperial University.—46 packets of seeds.
- Toulouse Botanic Gardens, France.—42 packets of seeds.
- Trinidad, Department of Agriculture.—Seeds of *Musa* sp.
- Utrecht Botanic Garden, Holland.—Plants of *Ceratopteris cornuta*, *Stenochlaena palustris* var. *scandens* and *Platyserium Wilhelminae-Reginae*.
- Washington, U.S. Department of Agriculture. Seeds and plants, including *Melaleuca Websteri*, *Aristolochia grandiflora*, etc.

Private donors :—

- Mr. A. Abbott, Sao Paulo, Brazil.—Plants of *Moquilea tomentosa*.
- Rev. J. Farnworth Anderson, Leicester.—38 packets of seeds (*Celmisia* spp.).
- Mr. F. R. S. Balfour, Dawyck.—Seeds, including *Nothofagus* sp.
- Mr. A. C. Bartholomew, Reading.—Plants and seeds of Alpines.
- Col. F. D. Bird, Melbourne.—Seeds of New Zealand and Australian plants.
- Hon. David Bowes-Lyon.—25 *Larix eurolepis*.
- Mr. N. E. Brown, Kew.—Seeds and plants of S. African succulents.
- Mr. A. K. Bulley, Neston.—45 packets of seeds.
- Mr. I. H. Burkill, Leatherhead.—Tubers of *Dioscorea* spp.
- Mr. W. J. Burstow, Haywards Heath.—A collection of orchids.
- Mr. H. Campbell, Kyrenia, Cyprus.—Miscellaneous seeds.
- Mr. A. A. Cavanagh, Playadito, Argentine.—Seeds of *Ilex paraguensis*.
- Mr. W. S. Chamberlain, Twickenham.—Seeds from South Africa.

- Mr. D. J. W. Chandler, Malvern, Melbourne, Australia.—Bulbs of *Lilium candidum*.
- Sir F. R. Chapman, Wellington, New Zealand.—Seeds, including *Alectryon excelsum*, *Entelea arborescens*.
- Hon. H. G. Chick, Shiraz, Persia.—Bulbs and seeds collected in Persia.
- Mrs. Collins, Sriracha, Siam.—Tubers of *Dioscorea* spp.
- Mr. W. G. Corbitt, Pacific Lumber Co., California.—North American tree seeds.
- Mr. W. Cradwick, Jamaica.—Seeds, and bulbs of *Bletia* sp.
- Miss A. Eastwood, San Francisco.—Miscellaneous seeds including *Arctostaphylos patula*.
- Mr. T. M. Endean, Laindon, Essex.—*Lithops Karas-montana* and *L. Schwantesii*.
- Professor R. R. Gates, King's College, London.—Seeds collected on the Mackenzie River Expedition, 1928.
- Mr. R. C. Bruce Gardner, Northwood, Middlesex.—Seeds of *Quercus* spp.
- Mr. C. S. Garnett, Derby.—A collection of orchids from the Amazon.
- Hon. Vicary Gibbs, Aldenham.—Seeds and plants.
- Mr. A. V. Giblin, Hobart, Tasmania.—Seeds, including *Drosera* spp.
- Dr. R. Guiseppi, Felixstowe.—A collection of bulbs and seeds.
- Mr. A. Haarer, Moshi, Tanganyika Territory.—Seeds, including *Begonia* spp., collected in Tanganyika Territory.
- Commendatore C. Hanbury, La Mortola, Italy.—65 packets of seeds.
- Mr. F. G. Hanbury, East Grinstead.—Trees, shrubs and herbaceous plants.
- Dr. A. Henry, Dublin.—Seeds of trees and shrubs.
- Miss A. E. Hill, Groendoorn, S.W. Africa.—Plants and seeds of succulents.
- Mr. E. M. Holmes, Sevenoaks.—Seeds of medicinal plants, including *Ephedra sinica*.
- Mr. C. W. von Hirschberg, Elizabethville, Belgian Congo.—Orchids, *Gladiolus* spp., etc.
- Capt. C. Ingram, Benenden, Kent.—Collections of plants, bulbs and seeds from S. Africa.
- Mr. Duncan S. Johnson, Johns Hopkins University, Baltimore.—Plants of *Leitneria floridana*.
- Mr. H. Johnson, Hynes, California.—Tubers of *Nymphaeas*.
- Capt. G. Garro-Jones, M.P.—Plants of *Hibiscus mutabilis*.
- Mr. C. C. Lacaïta, Petworth.—Bulbs of *Scilla Paui*.
- Mr. C. H. Lankester, Cartago, Costa Rica.—Collections of Costa Rican orchids.
- Mr. A. E. Lawrance, Venezuela.—Miscellaneous seeds and orchids including *Epidendrum leucochilum*.

- Dr. F. Lemperg, Austria.—40 packets of seeds and herbaceous plants.
- Dr. J. P. Lotsy, Velp, Holland.—Cuttings of *Salix caprea* hybrids.
- Dr. R. Marloth, Cape Town.—Seeds of *Welwitschia mirabilis*.
- Mrs. Mason, Canterbury.—A collection of South African bulbs.
- Hon. H. D. McLaren, Bodnant, N. Wales.—Plants of *Watsonia Galpinii*, *Rhododendron* spp., *Lilium Brownii*, etc.
- Mr. R. Page, Singapore.—Plants of *Vanda* "Miss Joaquim" (*Vanda teres* x *V. Hookeriana*).
- Major Albert Pam, Broxbourne.—Bulbs from Peru.
- Mrs. N. E. Parry, Lushai Hills, Assam.—Miscellaneous seeds and a collection of orchids.
- Mr. G. Reuthe, Keston.—Miscellaneous plants, including *Rhododendron suave* and *R. Metternichii nanum*.
- Mr. G. Robinson, Vina del Mar, Chile.—A large collection of seeds, bulbs and tubers of terrestrial orchids.
- Hon. Mrs. Ryder, Beaulieu.—Seeds and bulbs of South African plants, and a fine specimen of *Protea compacta*.
- Messrs. Sanders, St. Albans.—Extra fine bulbs of *Lilium sulphureum*.
- Mr. A. G. Soames, Uckfield.—Seedlings of *Rhododendron Aucklandii* x *auriculatum*.
- Mrs. E. W. Sexton, Plymouth.—Plants of *Mesembryanthemum* spp. and seeds of *Lilium Glehnii*.
- Mr. T. Sharp, Westbury.—Succulents.
- The Rt. Hon. The Earl of Stair, Lochinch, Wigtownshire.—50 bulbs of *Lilium giganteum*.
- Major F. C. Stern, Goring-by-Sea.—Trees and shrubs and 24 packets of seeds.
- Mrs. R. C. J. Swinhoe, Maymyo.—A collection of Burmese orchids.
- Lt. Col. E. E. Todd, Herne, Kent.—Seeds of *Viola* spp. and *Argyroxiphium sandwicense*.
- Miss D. Ulbricht, Leytonstone.—Filmy ferns.
- Mr. F. A. Weinthal, Sydney, N.S.W.—A collection of terrestrial orchids.
- Dr. A. H. Williams, Horsham.—Seeds from New Zealand.
- Mr. P. D. Williams, Lanarth, Cornwall.—Seeds and plants, including *Enkianthus quinquefolius*.
- Miss M. Wilman, Kimberley.—Plants of Cape succulents.
- Mr. A. Worsley, Isleworth.—Bulbs and plants.
- Mr. K. Yashiroda, Japan.—Seeds, including *Lilium* spp., *Rhododendron Schlippenbachii*, etc.

DISTRIBUTION OF PLANTS AND SEEDS.—There were 163 recipients of seeds sent out from Kew, the total number of packets distributed being 8,881: hardy trees and shrubs, 3,311, herbaceous plants, 5,570.

The most important seeds specially distributed included :— species of *Sorghum* from Nyasaland, *Pennisetum typhoideum*, *Aleurites Fordii*, *Arachis hypogaea*, *Ranunculus Lyallii*, *Libocedrus Bidwillii*, *Tephrosia toxicaria*, *Schinopsis Balansae*, *Nothofagus fusca*, *Ilex paraguensis*, *Lilium* spp.

Wardian cases of plants were despatched to the Botanic Gardens, Cameroons and Peradeniya ; also to the Department of Agriculture, Trinidad, and the East African Agricultural Research Institute, Amani, Tanganyika Territory. Other overseas consignments of a fairly bulky nature were sent to the Department of Agriculture, Bermuda ; H.E. the Governor, Malta ; and the Lieutenant Governor, Northern Provinces, Nigeria.

Other recipients of plants, etc., from Kew, included the following : His Grace The Duke of Abercorn, Government House, Northern Ireland.—Collection of trees and shrubs.

Algiers, Directeur du Service botanique.—Seeds of *Fraxinus numidica*.

Basle Botanic Garden.—Greenhouse and stove plants.

H.M. King Boris of Bulgaria.—Collection of herbaceous plants, etc.

British Guiana, Department of Agriculture.—Plants of *Codiaeum* spp., and various seeds.

Budapest, University Botanic Garden.—*Nuttallia cerasiformis*, *Prinsepia utilis*, *Dichotomanthes tristaniaecarpa*.

Cambridge, Botanic Garden.—Plants and seeds.

Cambridge, Pembroke College.—Plant of *Populus trichocarpa*.

Cardiff Parks and Open Spaces Department.—Seeds of herbaceous plants.

Rev. A. R. Collins, Studland Rectory, Dorset.—Plants of *Rosa*, *Rubus* and *Vaccinium* spp.

Mr. W. Cradwick, Jamaica.—Plants including *Liriope*, *Fuchsia*, *Pelargonium* spp., also seeds of *Clanthus Dampieri*.

Cruickshank Botanic Garden, Aberdeen.—Plants of *Maranta arundinacea*.

Cyprus, Department of Agriculture.—Seeds of *Perilla nankingensis* and *Rhus pentaphylla*.

Monsieur L. A. Dode, Paris.—Grafts of *Saxegothea*, *Podocarpus*, *Fraxinus*, *Planera* and *Ulmus* spp.

Dunedin, New Zealand, Public Gardens.—Seeds of *Lilium* spp.

Edinburgh, Royal Botanic Gardens.—Seeds, greenhouse and stove plants, trees and shrubs.

Giza, Egypt, Horticultural Section of the Ministry of Agriculture.—Seeds of *Victoria regia*.

Hon. Vicary Gibbs, Aldenham.—Bulbs, cuttings, trees and shrubs.

Glasnevin Botanic Garden, Dublin.—Seeds and plants.

Dame Alice Godman, Horsham.—Trees and shrubs.

Messrs. Hillier & Sons, Winchester.—Seeds, cutting and plants.

Mr. G. Lindley Hinde, Kamrup, Assam.—Plants, varieties of *Rex Begonias*.

Mr. C. W. von Hirschberg, Belgian Congo.—Orchids.
Hobart, Tasmania, His Worship The Mayor.—Plants of Shakespeare's Mulberry.
Hyde Park.—Plants and seeds.
Imperial Sugar Cane Station, S. India.—Sugar Cane cuttings.
Italian Somaliland, Botanic Station.—Seeds of succulents.
Leicester, University College.—Greenhouse and stove plants.
London County Council (Parks Department).—Collection of greenhouse plants.
London School of Hygiene and Tropical Medicine.—Plant of *Derris elliptica*.
Manchester Parks and Cemeteries Department.—Plants.
McMaster University, Toronto, Canada.—Plants of 12 species of *Anthurium*.
Melbourne Botanic Gardens.—Seeds of *Primula* species, cuttings of Kew Rambler Rose and Cricket Bat Willow.
Lt.-Col. L. Messel, Nymans, Handcross.—Plants, including *Manglietia insignis*.
Missouri Botanical Garden, St. Louis.—Plants of *Nepenthes* spp., seeds of trees and shrubs.
National Rose Society, 28, Victoria Street, S.W.1.—Plants and cuttings of *Rosa* spp.
New York Botanical Garden.—Plants of *Hemerocallis* spp., cuttings of *Populus* spp.
New York State Agricultural Experiment Station.—Seeds and cuttings of *Ribes* spp.
Nottingham University, Department of Biology.—Cuttings and plants of *Cupressus* spp.
Oxford, University Parks.—Trees and shrubs.
Major Albert Pam, Broxbourne.—Plants and bulbs.
Dr. V. B. Galeano, Legation for Paraguay, London.—Seeds of Rhododendrons.
Pietermaritzburg Botanic Society.—Seeds of trees and shrubs.
Division of Botany, Pretoria.—Peppermint plants, seeds, etc.
Richmond Park.—Trees and shrubs.
Rothamsted Experimental Station, Harpenden.—Seeds and plants of trees and shrubs.
Major L. de Rothschild, Exbury.—Tubers and plants.
Royal Botanic Society, Regent's Park.—Greenhouse and stove plants.
Hon. Mrs. Ryder, Beaulieu.—Plants and seeds.
Sandringham, Royal Gardens.—Greenhouse plants.
Seychelles, Department of Agriculture.—Plants of *Mentha arvensis*, "Japanese Peppermint."
The Rt. Hon. The Earl of Stair, Lochinch.—Plants and seeds.
Major F. C. Stern, Goring-by-Sea.—Bulbs, seeds and plants.
Swansea, Parks Department.—Seeds and economic plants.
Trinidad, Department of Agriculture.—Seeds of *Eucalyptus* spp., also seeds and suckers of *Musa* spp.

Toronto University, Department of Botany.—Cuttings of *Salix cinerea* var. *Medemii*.

United States Department of Agriculture (Federal Horticultural Board).—Seeds and succulent plants.

Utrecht, Holland, Botanic Garden.—Plant of *Bryophyllum proliferum*, cuttings of *Salix cinerea* var. *Medemii*.

The usual distribution of surplus trees, shrubs and herbaceous plants to educational and public institutions was made in February.

National Pinetum at Bedgebury.

The year 1928 was, on the whole, the most favourable of the last three years for the young trees at Bedgebury, although there were decided set-backs in several directions.

Climatic effects on plants.—The wet snow followed by frost and a subsequent rapid thaw, which occurred between Christmas Day, 1927, and New Year's Day, 1928, caused a number of losses amongst the more tender plants, and several species that had stood for two years were killed. A few of the deaths were *Araucaria brasiliana*, *Juniperus procera*, *Widdringtonia cupressoides*, *W. juniperoides*, *W. dracomontana*, *Cunninghamia Konishii*, *Abies religiosa*, and several plants of *Cupressus Macnabiana*, whilst various species of *Podocarpus* were seriously injured. It is possible that some of these plants might prove hardier if they could escape severe cold long enough to enable them to become really well established.

Mild weather was experienced during March and early April, which resulted in early growth. Later, the mild weather gave place to cold winds and frosts extending over several weeks, which shrivelled up the young shoots of many of the European and Asiatic species of *Abies*, *Picea* and *Tsuga*. During this time young shoots of Sweet Chestnut, *Rhododendron ponticum* and the young fronds of Bracken were also killed. This is the third spring in succession that young shoots have been crippled, and the repeated checks have resulted in many plants becoming stunted, while some have been killed outright.

Some of the most seriously injured plants were:—*Abies Fabri*, *A. bracteata*, *A. cephalonica*, *A. pectinata* (small plants), *A. Faxoniana*, *A. holophylla*, *A. nephrolepis*, *A. Pindrow*, *A. recurvata*, *A. sachalinensis*, *A. squamata*, *A. Webbiana*, *Picea albertiana* and variety *conica*, *P. jezoensis*, *P. likiangensis*, *P. Morinda*, *P. Maximowiczii*, *P. Schrenkiana*, *P. Wilsonii*, *Tsuga Brunoniana*, *T. chinensis*, *T. diversifolia*, *T. yunnanensis*.

A good many interesting facts relating to susceptibility to injury by spring frosts, and recovery from the same, may be noted among the many species in cultivation at Bedgebury.

Amongst the new species of *Abies* the one that has withstood spring cold most satisfactorily is *A. koreana*. That species was scarcely injured owing to its starting into growth later than other

species. The N. American firs, *Abies nobilis*, *A. grandis*, *A. concolor*, *A. Lowiana*, *A. magnifica* and *A. amabilis* escaped injury, but *A. balsamea* and *A. bracteata* were badly cut.

Several of the newer species of *Picea* withstood the spring cold very well, notably *P. asperata*, *P. brachytyla* and its variety *purpurea*, and *P. morrisonicola*. Of the two species of *Sequoia*, *S. gigantea* appears to be less susceptible to injury by cold, in a young state, than *S. sempervirens*. The various Cedars have not been injured, neither has serious harm come to any of the Pseudotsugas. One Larch, *Larix Griffithii*, was injured by spring frost, but although all the others were in full leaf during the cold period, they escaped serious harm.

From the end of May onwards the climatic conditions were favourable for tree growth, and owing to the excellent root system of the young trees, some of those that had been injured by frost exhibited remarkable powers of recuperation, so much so that it is confidently expected that many of the injured plants will form new leading shoots during 1929 if spring frosts are not experienced. Several instances of recovery from frost injury are already very noticeable. An outstanding case is that of *Picea jezoensis* var. *hondoensis*. The variety was less severely cut than the type, but the young shoots were seriously checked. However, several trees have made a good recovery, forming leading shoots a foot or more long during summer. In fact one plant, 14.X.F., recovered from the 1927 cold and formed a leading shoot 17 inches long, whilst in 1928 the same plant added 25 inches to its height. Another plant of the same variety, 14.X.A., formed a leading shoot 19 inches long in 1928, after being badly frozen in May, 1927, and less severely frozen in May, 1928. The best plant of *P. jezoensis* is still struggling to live and has formed very little new growth since the May frost.

Damage by wind.—The Pinetum suffered severely from wind on November 16th, but entirely amongst the old trees. Altogether 30 trees were either blown down or broken off and they were not the most exposed trees. They were mostly in two groups and included 4 *Abies grandis*, 1 *A. nobilis*, 3 *Tsuga Albertiana*, 1 *Cupressus Lawsoniana*, 1 *C. thyoides*, 1 *Thuja plicata*, 2 *Pseudotsuga Douglasii*, 1 *Juniperus chinensis*, 4 *Pinus sylvestris*, 2 *P. Laricio* var. *nigricans*, 2 Oaks and 4 Hollies. The extent of the loss can be gathered from the fact that all were well-grown trees 60 years old and upwards. It was difficult to get exact measurements at the time, but one of the *Abies grandis* was approximately 85 feet in length and 8 feet 2 inches in girth about 7 feet from the base. The leading shoot made during the previous summer was 19 inches long. The other *Abies* and the Tsugas were very similar in size. The longest *A. grandis* measured was 95 feet. One of the Douglas firs was between 80 and 90 feet in length and the girth was 6 feet 5½ inches. The largest Scots Pine was 87 feet long. The position occupied by these trees was rather wet, the natural water level throughout a considerable part of the

year being 12 to 18 inches beneath the surface. The soil is loam overlying Kentish rag. It was interesting to notice the difference in root penetration in these different trees. Pines and Oaks were deeply rooted and were apparently more or less indifferent to the presence of a high water level or hard pan. *Abies*, *Tsuga*, *Thuya*, *Cupressus* and Douglas Fir on the other hand had failed to penetrate the pan and their roots had spread out over very wide areas above the water level. In all cases very wide masses of earth were torn up with the roots: in several instances these masses were 20 to 25 feet across and rarely more than 12 to 15 inches thick. The Hollies were well-grown old trees in a drier situation. The roots had penetrated the pan which in that area is 6 to 9 inches below the surface.

Insect and fungus pests.—Some injury was done to the American Spruces in March and early April by *Aphis abietina*, but it was kept in check by spraying. It would appear that this pest is likely to recur year by year and a sharp look out for infested plants in March will be very necessary. Species of *Dreyfusia* are present on some of the *Abies*. This again appears to demand critical attention. Pine weevils were not so noticeable as in the two previous years, the damage done being comparatively light. It is hoped that this pest may now disappear. Pine-shoot Tortrix moths are responsible for some damage. Here and there plants have been killed by *Armillaria mellea*, the fructifications of which have been prominent on old tree butts and on dead Araucarias in the Avenue near the farm.

Progress of young trees.—Trees that have escaped injury by frost or other agencies are making excellent progress, the Junipers, Thuyas, Cypressess, some of the Tsugas, Douglas Firs, Cedars and Larches being in very good condition. The policy of planting in well-prepared holes, with the pan broken, has been amply justified. Even trees that have been injured have developed an exceptionally good root system, which, in the event of a favourable spring, will materially assist the injured branches towards recovery.

The vigour of the Larches is particularly noticeable, and with the exception of *Larix Potaninii* and *L. Griffithii* they have grown well. It is interesting to compare the development of various species. As a rule *Larix leptolepis* develops more rapidly in a young state than *L. europaea*, but at Bedgebury the latter species has grown more rapidly than either the Japanese larch or the hybrid *L. eurolepis*. The most rapid growth of any tree planted at Bedgebury is that of *L. europaea* var. *polonica*, 10.X.D. This was planted on 21st March, 1925, and it was then 2 feet 6 inches high. Measured in March, 1928, it was found to be 13 feet 4 inches high, and though not accurately measured at the end of the growing season of 1928, it was then approximately 16 feet high, and heavily branched. The wide spacing of the trees has resulted in the production of many branches and a good deal of pruning will be necessary. So far the young larches do not show any signs of Larch Canker, although young trees in a plantation little more than 100 yards away are badly

cankered. Their present immunity is apparently due to hygienic conditions produced by wide spacing and thorough ground preparation. *L. occidentalis* is alone in developing meagre side branches.

Natural regeneration.—In previous numbers of the Bulletin it has been explained that the ground on which the Pinetum has been formed was partly Chestnut Coppice with Oak, Holly and Conifer standards and partly a wood of Scots Pine. Many of the Hollies and rarer Conifers were left. Since 1925 the practice has been followed of cutting down weeds throughout the area once or twice a year, and rabbits have been excluded, therefore seedling trees have had a chance to grow. This has resulted in an enormous crop of young Birch; about the Hollies a very heavy crop of seedling Hollies; in several places large numbers of seedling *Cupressus Lawsoniana*; Scots Pine seedlings almost everywhere (the forester at Bedgebury collected 13,000 two-year seedlings from the Pinetum last spring and planted them in his nursery for forest planting this winter); a small number of seedlings of *Thuya plicata*, *Pseudotsuga Douglasii* and *Picea sitchensis*, in addition to several other species.

The cutting of coarse weeds is allowing Ling (*Calluna vulgaris*) and Heather (*Erica cinerea*) to make progress in several directions, and here and there are considerable masses of Broom (*Cytisus scoparius*), which is being left for the present to provide a little shelter and to help in keeping down other weeds.

The Museums.

GENERAL.—The congested state of the Museums makes the work of incorporation of new specimens difficult, and it is only by a judicious system of elimination of the older material that space can be found for new plant products. Such a system has very definite limits, owing to the Museums exhibits being complementary to other collections in the establishment. Series of plant products which have been presented by merchants, or by firms of manufacturers, in course of time become out of date, or deteriorate in colour and quality. In the interests of economic botany they must be retained, and an effort is being made to induce donors of special exhibits to renew them as occasion warrants.

The congestion in the Museums is felt in another direction. Owing to limited space, small specimens only can be shown. Such specimens are quite large enough for botanical purposes, but they are often inadequate to convey to the lay mind in proper perspective, an idea of the importance of certain products. In the interests of education and trade, it is desirable that imposing displays should be made of some of the more important products of plants.

Again, the successful exhibition of timber presents a difficult problem. From a botanical standpoint small specimens of wood are often sufficient, providing they are correctly named, but timber merchants and manufacturers want to see typical plank specimens in order that they may form an idea of the quality of the wood and

its probable use. For their purpose typical plank specimens 6 feet and upwards in length, and of the width of the tree, are required. An effort is being made, in the two Museums devoted to timbers, to remodel the collections with a view to giving prominence to commercial woods. At the same time collections of hand specimens of woods of various countries, not necessarily woods of commercial importance, are being built up for botanical purposes.

A direction in which the value of the Museums devoted to timber could be extended, would be in the exhibition of articles manufactured from the lesser known kinds of woods which the Colonies and Dominions would like to place upon the market. A commencement has been made in this direction by having seats for the accommodation of visitors manufactured from woods that are rarely used for such a purpose. However, to pursue such an object to the desired end would necessitate a good deal more floor space than is available.

ROUTINE WORK.—As usual a good deal of time has been spent in attending to correspondence and enquiries made at the Museums on economic products and subjects relating to plant cultivation.

Attention to labels, the incorporation of new specimens, and the removal of specimens in rooms given over to workmen, necessitated much work amongst the collections.

SPECIAL WORK.—Investigations were made concerning species and varieties of *Musa*, and with regard to two fibre plants recently brought to public notice. An Assistant has continued to devote part of his time to work on timber anatomy.

During the year several special exhibits were made in the Museums, and a permanent exhibit of Fodder Grasses has been arranged.

The Keeper has continued to act as Executive Officer for the Pinetum at Bedgebury.

PUBLICATIONS.—A new Guide has been published to the Collections in Museum No. II. Other publications by the Museum Staff include "The Banana in some Tropical Eastern Countries—its forms and variations" (*K.B.* 1928, p. 305); "Trees in Roads and Streets—their establishment and maintenance" (*Quarterly Journal of Forestry*, 1928, p. 19); "Trees for Parks, Streets and Roads" (published and distributed by the Institution of Municipal and County Engineers).

MAINTENANCE WORK.—H.M. Office of Works have redecorated portions of three Museums and the North Gallery, but a good deal of redecoration is still required.

In Museum No. II, one of the oldest buildings in the Gardens, an outbreak of dry rot occurred which necessitated the removal of several cases, floor boards and joists, the heating of a wall to destroy the fungus, and other work. Half the building had to be closed to the public for several months.

A commencement has been made with the repainting of the insides of the cases in Museum II. As far as can be ascertained it is over 50 years since these cases were last painted.

PRESENTATIONS TO MUSEUMS.—Mr. M. T. Dawe, Sierra Leone.—Photograph of branching specimen of the African Oil Palm. Also fruits of African Oil Palm.

Mr. R. C. Notcutt, Woodbridge.—Log of *Eucalyptus Gunnii* grown in this country.

Mr. F. N. Howes, Kew.—Various economic plant products collected in Burma, Malaya and Siam.

Mr. Rudolf Block, New York.—Ten specimens of Brazilian Woods.

Conservator of Forests, Trinidad.—Twenty-six specimens of Trinidad Woods.

H. E. Phya Daruphan Petak, Royal Forest Department, Bangkok.—Collection of hand specimens of Siamese Woods.

Mr. A. W. Playne, Bedford.—Leaves and small sample of Assam Indigo (*Strobilanthes flaccidifolius*).

Sir Algernon Aspinall, C.M.G., C.B.E., West India Committee.—Sample of Megass from Sugar Cane refuse.

Mr. L. Palmer, London.—Specimens of Jedari (*Rhus oxyacantha*).

Messrs. John K. King & Sons, Coggeshall.—Specimens of British Fodder Grasses.

Dr. Carlos Moreira, Rio de Janeiro.—Seeds of *Moquilea tomentosa*.

Mr. T. Hay, Hyde Park.—Fruits of "Colombian Bramble" (*Rubus macrocarpus*).

Messrs. Knowles & Foster, London.—Specimens of the "Ouricury Palm" from Brazil.

Messrs. Joseph Terry & Sons, Ltd., London.—Fruits and Flowers of various forms of *Theobroma Cacao*.

Mr. G. N. Selous, British Consulate, Casablanca, Morocco.—Specimens of wood and berries of "Tizrah" (*Rhus pentaphylla*).

Messrs. Clarence Elliott, Ltd., Stevenage.—Burs and galls of *Nothofagus* sp. from Tierra del Fuego.

Mr. E. Graham, Brisbane.—Twenty-one photographs illustrating Forestry, etc., in Queensland.

Miss M. M. Whiting, Blythburgh.—Seven sections of wood.

Dr. Jordan, Director of the Research Station of the Paint and Varnish Manufacturers' Association, Teddington.—Exhibit of Tung Oil and Perilla Seed Oil.

Chief Conservator of Forests, Pretoria.—Hand specimens of South African Woods.

British Legation, Athens.—Turkish Tobacco Seed, variety "Cavalla."

Mr. R. D. Oldham, Kew.—Photograph of the largest Cypress tree in India, growing at Deota, West Garhwal.

The British Drug Houses, Ltd., London.—Specimen of Ephedrine Hydrochloride.

Dr. G. H. Rodman, Putney.—Copies of radiographs of *Citrus* fruits, with the fruits from which the radiographs were prepared.

Mr. C. W. Kermode, Forest Botanist, Maymyo.—Collection of hand specimens of Burmese Woods.

Mrs. Collins, Sriracha, Siam.—Thirteen samples of Siamese varieties of Rice.

Captain E. Holland, Finchley.—Two specimens of Kauri Pine with Resin.

Mr. F. A. Stockdale, Peradeniya.—Two photographs of *Entada scandens*.

Sir Herbert Cook, Bt., Monserrate, Portugal.—Cone of *Araucaria Bidwillii*.

Mr. C. J. Trist, Provisional Forestry Board, Brisbane.—Twenty-four hand specimens of Queensland Woods.

Director, Department of Agriculture, Rhodesia.—Seven samples of Rhodesian Fodder Grasses.

Major R. H. Thomas, c/o Casa Tagua, Esmeraldas, Ecuador.—Collection of small specimens of Central American Woods.

Mr. S. Kessell, Conservator of Forests, Perth, W. Australia.—Three photographs of Jarrah and Karri Forests.

Mr. W. R. Price, London.—Samples of textile made from fibre of *Musa loochooensis* in the Loochoo Islands.

Miss M. S. Johnston, Kew.—Picture of *Tibouchina*, painted by a Chinese artist on Rice Paper.

The Jodrell Laboratory.

The varied material examined microscopically for purposes of identification included a large proportion of samples of wood (commercial timbers, etc.). A few of the items dealt with were as follows :—two collections of ancient specimens (wood, leaves, fruits, etc.) from Egypt ; some archaeological specimens of wood from Transjordan and Palestine ; several Chinese drugs from a large series being dealt with by Dr. D. Hooper ; parts of plants used as remedies for snake-bite ; pollen taken from honey, and a sample of rope which proved to consist of a mixture of Manila Hemp and an *Agave* fibre. A further study of some developmental stages of the ovule of *Typhonodorum Lindleyanum* was made in collaboration with the Director, and observations were begun on the silica-bodies in the tissues of some Monocotyledons.

Miss E. Lyall carried out a series of experiments on the use of different fumigants as a means of controlling White Fly (*Aleurodes vaporariorum*) and Leaf Hopper (*Zygina parvula*) in greenhouses.

Miss I. Manton prepared material of the roots of about forty species of *Cruciferae* for cytological work, and studied the morphology of the chromosomes in this material.

Dr. G. H. Rodman examined a number of plants attacked by White Fly and by the Leaf Hopper, and made observations on the life-history of these two insects.

Mr. W. C. Worsdell completed his investigation on the anatomy of fasciated and normal plants of *Campanula carpatica*, begun in 1926 on behalf of the John Innes Horticultural Institution, Merton.

Members of the Herbarium Staff prepared and examined cultures of a number of Fungi, the determination of which was required, and also carried out some work on *Heteropatella Dianthi* (attacking carnations), and on a die-back disease of *Rhododendron*, in connection with researches on these subjects (see p. 38).

The Herbarium.

A considerable portion of the second part of the cabinet extension programme, namely, the provision of an extra tier of cabinets above the existing blocks on the ground and first floors, was carried into effect in 1928. Extra tiers were supplied on the ground floor of the west wing and on the ground and first floors of the north wing, with the exception in both wings of the end walls. The additional space thus afforded permitted the adjustment of crowded material and the incorporation of a vast number of sheets which had been temporarily stored.

Highly satisfactory progress was made with the old collections in the Store. Not only were some 30,000 sheets laid in, but about 15,000 were dispatched as duplicates to various other herbaria. As far as flowering plants are concerned, practically only a few of the very large collections of the old material of long standing remain to be mounted. The constant influx of new material which has to be accommodated in the Store no longer permits the possibility of treating the old Store material separately. Some of the recent material requires early attention, hence the Store mounters have to be employed in dealing with both old and comparatively recent collections. As the amount of incoming material has increased during recent years the total decrease in the amount of material in the Store is not so rapid as was estimated when the Store staff was originally appointed.

The increase in the number of graduate students and research workers from Universities and Institutions who visit the Herbarium or come for periods of study is worthy of comment, since it indicates a closer co-operation between workers in various branches of Botany. The number of botanists from abroad and various parts of the Empire who visit Kew in connection with taxonomic and floristic investigation is likewise a source of satisfaction, even though it often necessarily involves the staff in much extra work. Such co-operation is highly desirable, being of great value to Kew and to botany as a whole.

Mention of publications by members of the staff and visiting botanists will be found under the respective geographical headings, but reference may be made here to the following important volumes which appeared during the year. Part 2 of Vol. I of the Flora of West Tropical Africa, by Mr. J. Hutchinson and Dr. J. M. Dalziel,

was published in July and carries the Flora as far as the family Umbelliferae. Advance copies of the volume by Mr. W. B. Turrill entitled " Plant Life of the Balkan Peninsula " (for which the degree of D.Sc. of London University was conferred) were received in the autumn. A notice of this work, which will be invaluable to students of any branch of botany in the Balkan Peninsula, will appear in an early number of the *Kew Bulletin*.

EUROPE AND THE ORIENT.—*Routine*.—The work of the Store has been pushed forward as far as possible and more than half of the large Churchill Herbarium has now been dealt with. Attention has also been paid to recent collections and these have not been allowed to accumulate. In all approximately 9,000 sheets of newly mounted material have been incorporated in the Herbarium, whilst about 20,000 sheets have been sorted into families and temporarily arranged in cabinets in the cellars. As room and labour become available they are being transferred to their proper places in the general collection.

The writing up of genera according to recent monographs and standard floras has been continued. Genera dealt with this year include:—*Euphrasia*, *Bartsia*, *Saxifraga* (in progress), *Campanula*, *Hypochaeris*, *Leontodon*, *Onopordon*, *Sisymbrium* and *Trigonella*, the latter having been examined and revised by Dr. Schirjaev of the Masaryk University, Brno.

Considerable additions were made to the British collections. 540 specimens from the herbarium of the late L. A. M. Riley were presented by Mrs. Riley. Mr. J. Gladstone handed over another set of plants from the outlying islands of Scotland, this year from the lonely island of Foula. An account of this collection is being prepared for publication. Mr. W. R. Price also visited the North Shetlands last season and an interesting series of specimens was received from him. Mr. E. Thurston added to the many Cornish plants he has already given to the Herbarium and also forwarded to Kew a considerable amount of miscellaneous and useful material. As in previous years, Mr. J. E. Little presented many interesting British plants and over 2,000 sheets were contributed by various members of the Kew Staff.

The late Rev. E. Ellman again kindly invited Mr. N. Y. Sandwith to accompany him to the south-east corner of Spain for a month's collecting in April and May, with the result that specimens of some 380 species have been named and incorporated in the Herbarium. Another addition to the Spanish collections in the Herbarium was an exceedingly valuable set of 185 new or rare species received as a donation from Mr. C. C. Lacaita.

Further supplies from the Balkan Peninsula were received during the year which have assisted in rendering the Kew collections exceptionally rich.

From Palestine contributions were received from the Department of Agriculture, Forests and Fisheries, Jerusalem, in continuation

of previous collections. Of especial interest were a large number of *Calendulae* and an extensive series of grasses, and also plants from the Dead Sea area. A collection of some 400 plants made by Miss M. E. Edmonds, largely from Palestine, was received for naming, and this included many species poorly represented in the Herbarium.

Another Orient collection of interest was sent on loan for naming. This was a small set of plants from Ur, Chaldea. It formed part of the collections made by Dr. Leon Legrain on behalf of the British Museum (Natural History) and the University of Pennsylvania, and contained a new species of *Centaurea*.

Mr. B. Gilliat-Smith, H.M. Consul at Tabriz, has continued his valuable contributions from Azerbidjan. A marked feature of his collections has been the number of species, described by Boissier, Bornmüller, Grossheim and other botanists, not hitherto represented at Kew, or represented by very imperfect material. There is no need to emphasize the value of filling in gaps with excellent material, often from type localities. Further supplies of Persian plants have also been received from Mr. H. G. Chick, H.M. Consul at Shiraz, and from Mr. H. F. MacMillan, who brought home 356 specimens on his return from Abadan.

(See also under Experimental Work, p. 42).

Research and Publications.—The Plant Life of the Balkan Peninsula (Oxford, Clarendon Press).

Researches on *Silene maritima* and *S. vulgaris*: I. (*K.B.* 1928, p. 1).

New Plants from Spain (*K.B.* 1928, p. 150):

The Flora of St. Kilda (Botanical Exchange Club Report, 1928, p. 428).

Althaea setosa Boiss. (*Gard. Chron.* Sept. 1928, p. 167).

Balkan Peninsula species of *Veronica* (*Bull. Soc. Bot. Bulg.* II. 1928, p. 19).

The Teaching of Evolution and Heredity in Schools (*The School Science Review*, No. 36, 1928. Abstract of a Lecture given at Kew).

ASIA: INDO-MALAYAN REGION.—*Routine.*—The Store has now been completely cleared of Indian material, and the following series having been named and mounted were laid in during the year:—Dr. W. J. Treutler's collection from North Bengal (including Sikkim Himalaya), 534 sheets; Mr. A. Meebold's collection, the fruits of a journey in Manipur, the Naga Hills and Burma, received in 1909, 640 sheets; Dr. J. J. Wood's collection from Bihar and Orissa, 933 sheets; Sir Harold Deane's collection, 292 sheets, and also several other small outstanding lots.

Of material received during 1928, some of the most important was from Mrs. A. D. Parry, who sent a final instalment of her collections made in a little-known area of the Lushai Hills in Assam; Mr. C. E. Parkinson, Forest Botanist, Burma, who sent a fairly

extensive series of trees and plants mainly from Tenasserim ; Mr. A. H. G. Alston, Systematic Botanist, Ceylon, who forwarded a number of critical Ceylon plants ; Professor R. R. Stewart, Gordon College, Punjab, who sent a further instalment of the extensive series of Kashmir plants already presented to Kew, and Mr. B. B. Osmaston, who sent an interesting collection from the same area. Several parcels were received from Captain F. Kingdon Ward, representing the first instalment of the collections made on his 1928 expedition to Manipur, the Naga Hills and the Dihang Valley of Assam.

Mr. H. H. Haines generously presented his Herbarium of about 7,000 sheets during the year. The collection is mainly from Bihar and Orissa, an area formerly not well represented in the Herbarium, while a number of the plants are from the Central Provinces and the Western Duars of N. Bengal, both regions from which comparatively little material has been collected. There are over 500 specimens from Sikkim and a number from the United Provinces as well as from Burma. The collection contains several type specimens, and the authentic specimens of Mr. Haines's species and varieties recorded in the "Flora of Bihar and Orissa." Of the total number of some 7,000 sheets comprising the Herbarium, 4,659 have been incorporated in the Herbarium at Kew. Of the duplicates a set of 1,258 sheets has been presented to the Botanical Department of the University of Aberdeen.

Dr. A. F. G. Kerr has continued to forward large consignments of plants from Siam. Nearly 3,000 were received during 1928, mainly from the Peninsular portion of Siam, including the circles from Rachburi to Pattain and Paker. Interesting Siamese specimens were also received from Mrs. D. J. Collins. A set of about 200 named plants from Hue and the vicinity, collected by R. W. Squires, was presented by Dr. E. D. Merrill. As in previous years, Kew is greatly indebted to Professor W. G. Craib for identifying the extensive collections received from Siam.

Material for identification was as usual forwarded from the Director of the Botanic Gardens, Singapore, and a donation of 1,027 named duplicates from Borneo and Java was received from the Director of the Botanic Gardens, Buitenzorg.

Research and Publications.—Part viii of the Flora of the Presidency of Madras, comprising the families from *Ulmaceae* to *Xyridaceae* (in the order of the *Genera Plantarum*), was published during the year and further progress towards Part ix has been made.

The following papers appeared :—"Contributions to the Flora of Burma," Parts v and vi (*K.B.* 1928, pp. 42, 332), with the descriptions of 3 new species.

"Contributions to the Flora of Siam," by Professor W. G. Craib and Miss E. T. Geddes, Additamenta xxiv and xxv (*K.B.* 1928, pp. 62, 234), including in all the descriptions of 46 new species.

"*Amomom muricatum*" (*K.B.* 1928, p. 105).

"Malayan Magnolieae," by J. E. Dandy (*K.B.* 1928, p. 183), containing 12 new species, 6 new varieties and 2 new combinations.

CHINA AND NORTHERN ASIA.—*Routine.*—With the addition of a number of cabinets during the year, it has been possible to lay in about 6,800 sheets, which for lack of space had to be held over in the previous year. The labels on some 2,000 specimens of Mr. George Forrest's collecting, presented by the Royal Botanic Garden, Edinburgh, have been written up from his lists.

The Chinese material of *Polygonum*, *Rumex* and *Rheum*, which was sent on loan to Dr. Samuelsson, of Stockholm, and that of *Pilea* and *Lysimachia*, sent to Dr. Handel-Mazzetti, was on return re-arranged and incorporated according to the revised determinations. Several genera, notably *Corylus*, *Fraxinus*, *Ligustrum*, *Osmanthus*, *Styrax* and *Syringa*, of which monographs or revisions have recently been published, have also been written up and arranged accordingly.

Further progress has been made with the identification of the large collections made by Père Licent in Northern China and Mongolia. A number of Chinese flowering plants and cryptogams were received during the year, the largest consignment being a set of named duplicates from the National South-Eastern University, Nanking.

A considerable amount of cultivated material belonging to a number of critical genera has been named and studies have been continued on *Cotoneaster*. An investigation on certain species of *Sambucus* has also been commenced.

Research and Publications.—Work has been continued on the revision of the Old World species of *Buddleja* and the MS. is now ready for publication.

The publication of the proposed monograph of the Asiatic species of *Gentiana* and *Crawfordia*, referred to last year, has been delayed awaiting the loan of certain type specimens from abroad.

A paper entitled "New Asiatic Gentians" (*K.B.* 1928, p. 49), and another by the late Herr W. Becker, entitled "New Chinese species of *Viola*" (*K.B.* 1928, p. 247), have been published.

AFRICA.—*Routine.*—The routine work during the year has proceeded satisfactorily; some 10,000 specimens have been mounted, of which about 6,200 have been incorporated. With the exception of the very large collection of Mr. N. W. Thomas from Sierra Leone, all the old material in the Store has been cleared. The Thomas collection is being sorted into families and the specimens are being named concurrently with other material as the work on the "Flora of West Tropical Africa" proceeds, and duplicates are being set aside for distribution.

Work on the re-arrangement of the genus covers has been continued; many of the larger genera (such as *Clerodendron*, *Combretum*, *Cyperus*, *Grewia*, *Indigofera*, *Oldenlandia*) have been sorted

and divided up according to the five geographical divisions proposed for the Regional Floras of Africa.

With few exceptions current collections from the tropical African colonies received during the year have been determined, and lists of the identifications supplied. The largest from West Africa was forwarded from the Gold Coast by Sir A. Kitson, Director of the Geological Survey. Valuable material from the Gold Coast was also received from Messrs. T. Lloyd Williams, F. R. Irvine, C. Vigne and F. C. Deighton. From East Africa collections were received from Kenya Colony (H. M. Gardner, J. McDonald and W. Lyne Watt), Tanganyika Territory (A. E. Haarer, B. D. Burt), and Rhodesia (F. Eyles). The bulk of the East African material was from Tanganyika Territory, the collections of Mr. Haarer and of Mr. Burt, of the Game Preservation Department, being particularly large and containing several new species and species new to East Africa.

A considerable amount of work was carried out on tropical African grasses, over 1,120 specimens from various parts of Africa having been named, including collections from areas previously unrepresented in the Herbarium. Amongst the most interesting were sets from Sierra Leone (F. C. Deighton), Cameroons (T. D. Maitland), Kenya Colony (J. McDonald) and Mt. Elgon (J. D. Snowden), whilst from Tanganyika Territory valuable material was included in the collections mentioned above. Mr. Haarer's specimens were exceptionally interesting, since many of the specimens were from Pare District.

From South Africa the principal addition was a set from the Orange Free State collected and presented by Mr. C. A. Smith. In connection with a special study of the genus *Sorghum*, and in response to enquiries, several collections of this genus were received, notably from Tanganyika Territory, Uganda, Nyasaland, Basutoland, and a very large series from the Sudan.

The Assistant for South Africa was concerned largely with naming and laying in batches of specimens received from the National Herbarium, Pretoria, the Albany Museum, Grahamstown, from Professor C. E. Moss, the Rev. F. A. Rogers, and his own collections from the Fauresmith Division. An enquiry as to the disease of cattle known as "dun-siekte" led to the critical study of all the South African species of *Senecio* (§ *Paucifolii*), as this genus was concerned in the poisoning which preceded the disease.

Research and Publications.—Practically the whole of Mr. Hutchinson's time in the first half of the year, before his departure for South Africa on a collecting tour, was taken up in preparing for the press Part 2 of the Flora of West Tropical Africa, which was eventually published in July. This contains the remaining families of the Archichlamydeae (Sterculiaceae-Umbelliferae) and deals with many genera of great economic importance.

The MS. of the "Enumeration of Species of the Flora of the Seychelles Archipelago" to be published by the Percy Sladen Trustees

has been completed, and the Essay to accompany it has been commenced. Descriptions of new species and some new combinations have been published (*K.B.* 1928, p. 388).

The following papers have appeared during the year :—" Notes on African Grasses," parts vi and vii, by C. E. Hubbard (*K.B.* 1928, pp. 35 and 130), a continuation of the series commenced in 1926, and including descriptions of 9 new species.

" The Genus *Dichapetalum* in East, South Tropical and Sub-tropical Africa," by M. B. Moss (*K.B.* 1928, p. 115).

Descriptions of new species discovered and new combinations made during the course of the work on the Flora of West Tropical Africa were published under the heading " Tropical African Plants," parts ii-vi, by J. Hutchinson and J. M. Dalziel, in various numbers of the *Keew Bulletin*.

" Notes on the Forest Flora of South Central Africa," by P. J. Greenway (*K.B.* 1928, p. 193).

Progress has been made with regard to the Part of the Flora of Tropical Africa dealing with grasses. The account of the genus *Setaria* has been revised and prepared for publication, the number of species contained having been increased from about 40 to 74. The whole of the genus *Rhynchelytrum* has also been revised and other genera are in course of preparation.

The Assistant for South Africa was engaged on the preparation of a Flora of the Fauresmith Division, this involving the provision of a systematic list, the analysis of the flora and the mapping of the plant associations and communities. Before this work could be accomplished it was found necessary to revise the South African material of several genera. *Pterothrix*, *Amphiglossa*, *Ifloga* and *Trichogyne* have been thus dealt with, and the revisions will be included in the Flora of Fauresmith when published. In the case of *Salsola*, about 250 sheets were borrowed from Continental herbaria, and a paper has been prepared which will be published separately. Revisions of the genera *Cissus* and *Rhoicissus* will be published in the same way.

AMERICA.—*Routine*.—Progress in the work on material in the Store has been so satisfactory that most of the older collections have now been mounted and prepared for incorporation or naming, although a long time must elapse before complete identification will be possible. These collections include those of M. E. Peck and C. H. Lankester from Central America, that of W. C. Fishlock from Dominica and the Virgin Isles, and the valuable sets of Brazilian species collected by Ule, Usteri and Robert. Further progress was made with the work of naming and distributing the Lehmann collection, and the Monocotyledons have at length been reached. A few hundreds of the vast mounted collection of Hassler's plants from Paraguay were named and laid in. Among the American genera which were rearranged last year in accordance with the most

recent monographs were *Erythroxylum*, *Haplopappus*, *Chrysothamnus*, *Bejaria* and *Stachytarpheta*.

Of recent additions many plants from various parts of South America have been named and incorporated, such as those collected by Miss G. Dorrien Smith and Mr. C. L. Collenette in Matto Grosso, and in lesser quantity by Mr. Clarence Elliott and Dr. W. Balfour Gourlay in Chile, by Mrs. Blake in Patagonia, and by Mr. B. G. C. Bolland in Ceará.

Amongst interesting new collections received during 1928 must be mentioned a very fine set of Greenland plants presented by Mr. C. G. Trapnell on behalf of the Oxford Expedition to Greenland, and another collection made chiefly in the Mackenzie River district by Professor R. R. Gates and Mr. K. Mellanby.

A considerable amount of time last year was devoted to the investigation of the flora of the British possessions in America and the West Indies. Large collections made in British Guiana by Mr. L. S. Hohenkirk and other forest officers, and also by Mr. R. A. Altson, lately Government Botanist in that Colony, were for the most part identified. A small collection made by Mr. H. C. Sampson during his recent visit to British Honduras was also dealt with.

Research and Publications.—The important work of checking the MS. of the Flora of Trinidad and Tobago, which is now being issued in parts by the Department of Agriculture, Trinidad and Tobago, occupied Mr. Sandwith's spare time, and in connection with the Flora many specimens have been received from Mr. R. O. Williams, who has also kindly furnished material of numerous Trinidad species, which were previously unrepresented from that Colony in the Herbarium.

A number of very striking novelties from British Guiana were published in a paper entitled "New Species from British Guiana" (*K.B.* 1928, p. 365). A review of the Section *Orcheosanthus* of *Pinguicula*, which occurs in Mexico and Guatemala, appeared in a paper entitled "The Orchid-flowered Butterworts" (*K.B.* 1928, p. 230). An amaryllidaceous plant collected in Peru was identified with a species described and figured as long ago as 1725, and later placed in the genera *Pyrolirion* and *Zephyranthes* by Herbert and Baker; it was decided, however, that the species is actually a member of the North American genus *Cooperia*, and the new combination, with emended description, was published in a paper entitled "Discovery of the genus *Cooperia* in Peru" (*K.B.* 1928, p. 385). The late Herr Wilhelm Becker published an enumeration (including descriptions of many new species) of the violets gathered by Dr. A. W. Hill in Peru and Bolivia, and by Mr. H. F. Comber in the Andes of Argentina (*K.B.* 1928, p. 133). Other new plants described during the year included further novelties discovered in the Argentine Andes by Mr. H. F. Comber (*K.B.* 1928, p. 107); new species of *Nototriche* and *Malvastrum* detected in a series recently collected by Dr. Werdermann in Chile (*K.B.* 1928, p. 17);

"*Diacrodon*, a new genus of Rubiaceae from Brazil" (*K.B.* 1928, p. 32), a plant found by Mr. B. G. C. Bolland in the State of Ceará.

AUSTRALIA.—*Routine*.—Work was continued on re-arranging and writing up the Australian material in the Herbarium, the families from Compositae to Euphorbiaceae being now completed. There has been an increase of material for naming, partly as a result of the Director's visit, especially from Tasmania, Western Australia, New South Wales and Queensland, and material of critical groups from Sydney and Melbourne (e.g., *Potamogeton*, *Wahlenbergia* and *Melaleuca*).

Queries with regard to New Guinea have been numerous, and have led to a good deal of critical work. Particularly difficult is the determination of the large number of Papuan Figs collected by Brass and forwarded by Mr. C. T. White. Altogether 1,100 sheets from this area have been laid in.

Research and Publications.—The revision of the Australian *Frankenias* has been finished and is now in the hands of the Linnean Society for publication. A revision of the *Asperulae* of Australia was published by H. K. A. Shaw and W. B. Turrill (*K.B.* 1928, p. 81), and a paper on the Australian genus *Astrebla*, or Mitchell Grasses, by C. E. Hubbard (*K.B.* 1928, p. 257).

NEW ZEALAND.—*Routine*.—Critical points of taxonomy and also of nomenclature have constituted the main work in connection with New Zealand. Interesting specimens of *Hebe*, *Myrtus*, *Coprosma* and *Dracophyllum*, and several very valuable series of natural hybrids of *Gaultheria*, have been received from Dr. L. Cockayne and Dr. H. H. Allan, and these, together with a number brought back by Dr. A. W. Hill, have been examined and for the most part laid in.

Research and Publications.—A paper entitled "A new species of *Lilaeopsis* from New Zealand" was published (*K.B.* 1928, p. 266).

POLYNESIA.—*Routine*.—Time has only permitted of answering routine questions and naming small collections. A large collection of Fiji plants was received from Mrs. B. H. Tothill, as well as further instalments from Mr. W. Greenwood. An interesting series of specimens mostly of trees was forwarded by Mr. J. H. L. Waterhouse from the British Solomon Islands, but owing to their being mostly barren only a small proportion of exact determinations could be made. 850 sheets of Fiji plants were laid in and the families Goodeniaceae-Restionaceae were written up and provided with new covers.

Research and Publications.—A paper entitled "Notes on New Caledonian Orchids," by Dr. F. Kraenzlin, was published (*K.B.* 1928, p. 34).

FERNS, MOSSES AND HEPATICAE.—The writing up of the ferns according to Christensen's *Index Filicum* has been continued, and

the provision of additional cabinets has made it possible to arrange some of these in their new systematic order. About 8,000 sheets have been laid into the collection during the year, of which some 2,000 were presented by Fleet-Surgeon C. G. Matthew, R.N., who had collected them while serving on the China Station, in Japan, China, Philippines, Sumatra, etc. This is a valuable acquisition, for not only have the specimens been well prepared, but many of them are provided with rhizomes, a feature of great systematic importance too frequently lacking in herbarium specimens. Most have been named by Mr. Matthew himself, and some also have been noted by Japanese and Philippine pteridologists. The numerous ferns from the Indian herbarium of Mr. H. H. Haines have also been incorporated.

Amongst the arrears dealt with have been those from Col. Beddome (India), Dr. W. J. Treutler (Sikkim), Professor R. H. Yapp (Malay Peninsula), Mr. W. Hancock (China and Formosa), Mr. F. W. H. Migeod (Cameroons), and Dr. E. Hassler (Paraguay).

The ferns from most of the collections received during the year have been named; amongst these were specimens from Dr. A. F. G. Kerr (Siam), Mr. L. Gibbs (China), Dr. Harold D. Brown (Szechuan), Mrs. Parry (Lushai Hills), Capt. F. Kingdon Ward (Naga Hills), Sir Albert Kitson (Gold Coast), Mr. F. Eyles (Rhodesia), Mr. H. Carse (New Zealand), and Mr. B. G. C. Bolland (Brazil).

The collection made in Melanesia by Bishop J. C. Patteson (who was murdered in 1871), was named for and returned to St. Augustine's College, Canterbury. Unfortunately the value of these specimens is much reduced owing to the absence of any indication of the definite localities where they were collected.

About 800 Mosses and Hepatics have been incorporated during the year, chief amongst them being Dr. A. F. G. Kerr's Siamese and Professor Handel-Mazzetti's Chinese collections. Further work has been performed in separating out some of the more recently described genera. A set of Mr. W. R. Sherrin's Sphagnaceae has been purchased and incorporated.

FUNGI, ALGAE, LICHENS.—*Routine*.—Numerous miscellaneous enquiries have been dealt with, some of a fairly simple nature, such as the identification of British Fungi and examination of type specimens for workers abroad, whilst others involved considerable time and research into matters of taxonomy and nomenclature. Assistance in such matters has been supplied to the Ministry of Agriculture and Fisheries' Pathological Laboratory at Harpenden, to the Advisory Officers under the Ministry's Advisory Service and to research workers both at home and abroad.

Enquiries of economic importance concerned the distribution of ergot in rye and ergotin in rye flour in connection with an outbreak of poisoning in Lancashire due to the use of rye bread, the identification of fungi in connection with medical research, and examination

and advice with regard to plant diseases, especially of ornamental plants.

In the early part of the year considerable time was again given to nomenclature and other matters in connection with the List of Popular Names of Plant Diseases, prepared by the Plant Pathology Sub-committee of the British Mycological Society and, as mentioned last year, recommended by the Imperial Agriculture Research Conference.

Among collections received and named during the year are included Fungi from Uganda (Hansford), Borneo and Malay (R. E. Holttum), Siam (A. F. G. Kerr, Mrs. D. J. Collins), India (R. N. Parker), Australia (J. B. Cleland), Greenland (Oxford University Expedition), in addition to numerous miscellaneous specimens from other correspondents.

Following on the addition of an upper tier of cabinets on the ground floor, the whole of the Fungi have been moved, and the opportunity was taken to re-arrange the Myxomycetes according to the latest edition of Miss G. Lister's Monograph, and at the same time to lay in several years' accumulation of specimens.

Material was received from Ireland and Scotland of a new disease of the Asiatic species of *Meconopsis*. It was found to be due to the fungus *Peronospora arborescens* and enquiries were instituted as to its incidence and severity in the British Isles. The Keeper attended meetings at the Forestry Commission with reference to Dutch Elm Disease and observations on Elm trees were conducted during the season. A copy of the working list of diseases of trees in Britain, prepared at Kew, was forwarded to the Commission.

A few small collections of Algae and Lichens have been received during the year and most of these have been named and incorporated.

As in previous years Mr. R. Paulson has generously given assistance with regard to the determination of lichens, and he kindly named an interesting and difficult set of specimens from the dry laterite soil of the Koonamore Reserve, S. Australia, collected at the request of the Director when he visited this Reserve with Professor T. G. B. Osborn.

Research and Publications.—Further work has been carried out on the fungus causing Leaf Rot of Carnations, and a short paper has been prepared for publication. A note with additional evidence as to the connection between *Rhizoctonia Crocorum* and *Helicobasidium purpureum* is also in the press.

An investigation on a die-back of Rhododendrons, distinct from the vascular disease mentioned below, is still in progress, but the parasitism of the fungus involved in this case is doubtful and appears to be dependent on the presence of certain unfavourable conditions.

A vascular disease of seedling Rhododendrons has continued to cause losses in the Arboretum Nursery, and Mr. C. J. A. Berkeley, of

the Imperial College of Science, continued his investigation of the fungi present, a species of *Ramularia* being apparently parasitic and responsible for the death of the plants.

SUMMARY.—The following table summarises the routine work, apart from naming, accomplished by the regular staff and by the special Store staff during 1928, excluding the lower cryptogams.

Mounted	...	...	...	approx.	80,000
Incorporated	...	...	...	...	58,530
Duplicates distributed	...	...	...	...	16,968
Specimens received on loan	...	...	...	...	2,414
Specimens sent out on loan	...	...	...	...	4,027
Specimens presented or purchased	...	...	...	...	38,536

FRUIT AND SEED COLLECTIONS.—These have been added to very considerably during the year. A notable addition was a collection of 691 packets of Canadian Weed Seeds, generously presented by Mr. E. Archibald, Director of the Experimental Farms, Ottawa. A valuable series of fruits was also presented by Mr. B. D. Burt from Tanganyika Territory, including some 50 species of Leguminosae, several of which were not previously represented in the Herbarium. These were received in excellent condition and are accompanied by useful ecological notes. "

COLLECTION OF DRAWINGS AND PHOTOGRAPHS.—A large number of illustrations of plants have been received during the year and 480 have been placed in the collection. Mr. W. R. Price presented the photographs made during his tour in Formosa, Ceylon and Malaya. Dr. H. M. Hall presented 63 prints of Compositae and *Pentstemon*. A set of useful prints of Cacti was received from the United States National Museum, Washington, and a valuable series of 202 prints of Labiatae, many being of type specimens, was received as a donation from Dr. C. Epling. In addition to the above, whenever time permits the type specimens sent on loan to Kew from other herbaria are photographed and prints placed in the collection. Upwards of a hundred prints were added in this way during the year.

Dr. L. Cockayne and Mr. W. B. R. Oliver sent photographs of New Zealand plants, and Mr. R. A. Dyer of South African Euphorbias. In both these cases the photographs show the habit of the plants and so supply what is often a deficiency in the collection.

Amongst portraits received have been those of Baroness Burdett Coutts, who presented Schimper's Moss herbarium in 1880, and Professors F. O. Bower and J. W. H. Trail.

NOMENCLATURE.—Preparations for the International Botanical Congress to be held in 1930, at which the subject of nomenclature will occupy an important place, continued during the year. The general experience of systematic botanists during the eighteen years

which have elapsed since 1910, the date of the Brussels Congress, has been that the International Rules of Nomenclature have on the whole proved satisfactory, and have led to greater uniformity and stability in the naming of plants. As time went on, however, it was increasingly realized that the wording of certain of the Rules is ambiguous, so that even expert nomenclaturists sometimes disagree as to their correct interpretation and their application to particular cases.

One of the more important tasks of the Congress will be to remove such ambiguities in the Rules by means of a revision of the text where necessary. It is chiefly the Rules regarding homonyms and those dealing with non-valid names that are concerned. A memorandum on the subject of generic and specific homonyms was accordingly drawn up at Kew in March, 1928, and sent to a number of representative botanists in different parts of the world, so that the question might receive adequate consideration in advance of the Congress.

Those who have studied the history of plant-nomenclature during the last fifty years are well aware that it is difficult to forecast the general effect of a proposed rule, unless its results have been previously tested in an adequate series of cases. Hence it is not surprising that one or two of the Rules of 1912 should have proved to be unsatisfactory in actual practice. Among them is Art. 56, which deals with the subject of "valid" and "non-valid" names. The great amount of research which is sometimes required in order to ascertain whether a particular name is "valid" or "non-valid" is almost prohibitive. It might possibly be better to discard the concept of "valid" and "non-valid" names and to accept the date of the effective publication of a name for purposes of priority, even although the action of the author in proposing that name contravened the provisions of the International Rules (1912). The effect of this suggested alteration in the Rules is accordingly being tested at Kew, in order to see whether it would on the whole have a beneficial effect in stabilising names in current usage.

The preparation of a supplementary list of conserved generic names has been continued, and is now approaching completion. Numerous names have been suggested for conservation by correspondents abroad and at home, and these cases have been investigated. In some it was found to be unnecessary to conserve the name, since it was actually the correct name for the genus under International Rules (e.g., *Cinnamomum*, discussed in *K.B.* 1928, p. 41). In others it was considered to be inadvisable to conserve a name, owing to its being misapplied (e.g., *Marica* Herb. non Schreb., investigated in *K.B.* 1928, p. 278), or to the arguments in its favour being too weak (e.g., *Villebrunea*, dealt with in *K.B.* 1928, p. 395). A *prima facie* case for conservation was established, however, for about half the names suggested, and some of these have accordingly been added to the supplementary list, which, when completed, will include about

eighty names. It will be submitted to the International Committee on Nomenclature appointed at Ithaca, in 1926, for the purpose of receiving and considering proposals dealing with plant-nomenclature, and of making recommendations on that subject to the International Congress, 1930.

A minor question of nomenclature, yet one of considerable practical importance, is the correct spelling of generic names. The differences of usage in the official publications of Botanic Gardens in various parts of the world were so great, that the authorities of the Brooklyn Botanic Garden were led to issue a series of communications on "International Seed Exchange" (Nos. 1-9: 1923-1928), in the hope of arriving at agreement in this respect. In response to enquiries addressed to Kew from various sources, the correct spelling of numerous generic names has been determined in accordance with the International Rules, and lists, including altogether 181 names, have been published (*K.B.* 1928, pp. 113, 285, 337), or are in the press. It is hoped that these varied examples may serve to illustrate the method of ascertaining the correct spelling of a generic name under the Rules, and may lead to greater uniformity in this respect.

The following papers dealing with nomenclature were prepared at Kew and published during 1928: "*Camphorina* and *Septina*" (*K.B.* 1928, p. 41); "The Correct Spelling of certain Generic Names" (*K.B.* 1928, pp. 113, 285, 337); "*Setaria glauca* and *S. lutescens*" (*K.B.* 1928, p. 147); "The last Issue of the Journal de Botanique" (*K.B.* 1928, p. 155); "The Nomenclature of *Bromus*" (*K.B.* 1928, p. 209); "*Dalzellia* or *Belosynapsis*" (*K.B.* 1928, p. 252); "The Generic Names *Miconia* and *Myconia*" (*K.B.* 1928, p. 268); "*Marica* and *Neomarica*" (*K.B.* 1928, p. 278); "*Oreocnide* versus *Villebrunea*" (*K.B.* 1928, p. 395); "*Juncus alpinarticulatus* (Journ. Bot. 1928, p. 210); "The Standard-Species of *Nymphaea* L." (*Rhodora*, 1928, p. 53).

INDEX KEWENSIS.—During the past year the compilation of the Index Kewensis, Supplement VII, was completed, and to a large extent prepared for the Press. By the end of the year three-quarters of the manuscript had been despatched to the Clarendon Press, the total number of reference cards being over 34,000. During its preparation citations to several old genera have been added in order to conform to the International Rules; the necessity for these reference changes is in a large measure due to the fact that the year 1735 (and not 1753) was formerly adopted as the starting point for genera. After each generic name the family to which it is now assigned is indicated in brackets; in cases where a genus had been placed in a different family in the 'Genera Plantarum' of Bentham and Hooker that family also is indicated. About half the number of first proof sheets were received and returned by the end of the year. At the present rate of progress the new Supplement should be published during the summer of 1929. The compilation of Supplement VIII (1926-30) has been started.

EXPERIMENTAL WORK.—Although interesting specimens of all kinds are welcome, and are kept under observation in the Experimental Ground, work has tended to concentrate on special genera. In connection with the combined genetical and ecological study on all the British representatives of the genera *Silene* and *Centaurea*, now being carried on at Potterne and Kew, an increasing amount of space is inevitably being devoted to these two genera. Reserves and controls of the experimental material have also to be kept. Selfed lines of *Plantago* have been investigated for the Transplant experiments being undertaken on behalf of the British Ecological Society.

At Potterne, in the grounds of Mr. E. M. Marsden-Jones, a large amount of genetical and biological research is being continued. The work is being extended and the co-operation of a cytologist and an anatomist has been secured. Last year many hundreds of plants of *Silene* and over a thousand of *Centaurea* were flowered and scored, and further controlled crossings were made. The F_2 generation of 450 plants of the new true-breeding tetraploid *Saxifraga potternensis* was studied and an F_3 generation of 500 plants was raised. Studies on the sex and colour in species of *Ranunculus* and on the microforms of *Anthyllis* were also continued. Four of the six species to be used in the transplant experiments are now in position and interesting results have already been obtained with *Silene maritima*. Mr. R. O. Whyte, of the Botany School, Cambridge University, is studying the cytology of the plants used in the genetical and transplant experiments, and very interesting results have already been obtained with *Ranunculus* and *Silene*. The assistance of Dr. Clara A. Pratt, of the Imperial College of Science, has been secured for anatomical studies and she has commenced work on *Silene*. Extensive series of the specimens used in all these experiments have been dried and presented to Kew.

With the increased attention paid to genetical work and to the intensive biological and experimental study of certain genera it has been necessary to consider the question of the most suitable means of accommodating the material which it is necessary to preserve. To prevent unequal representation in the general Herbarium it was decided to establish two separate herbaria. The small room off the visitors' room, therefore, has been set aside to accommodate an ecological herbarium and a genetical herbarium. These herbaria together are already represented by between two and three thousand sheets and it is expected that they will grow at a rapid rate. An account of the ideas underlying the formation of these herbaria is shortly to appear in the *Journal of Ecology*.

VISITORS.—About 5,544 names appeared in the visitors' book for 1928.* The names of some of the most notable and frequent visitors, with an outline of their sphere of work, are given below.

*The number of visitors for the year 1927 should have been 5,224 and not that given in *K.B.* 1928, Appendix i. p. 33.

As in previous years Dr. O. Stapf and his staff working on the Botanical Magazine and the Index Londinensis were accommodated in the top floor rooms of the Library. Thanks are due to Dr. Stapf for assistance with various questions relating to the Gramineae. Members of the staffs of various other institutions in or near London also visited the herbarium repeatedly, notably those of the Department of Botany, British Museum (Natural History), the Imperial Bureau of Mycology, the Imperial Forestry Institute, Oxford, and the John Innes Horticultural Institution, Merton. Amongst botanists especially interested in the flora of Britain and various parts of Europe the most frequent callers were Messrs. C. E. Salmon, J. Fraser, E. M. Marsden-Jones, C. C. Lacaita, C. Norman, A. Bruce Jackson, R. Lloyd Praeger and H. W. Pugsley. Mr. L. Hall paid weekly visits in connection with literature on cellulose, and Miss I. Manton, of the Botany School, Cambridge, continued work in the Herbarium and Library in connection with her cytological studies on the root tip of various genera of Cruciferae. Valuable assistance was given by Mr. E. Milne-Redhead in an honorary capacity from September onwards in re-arranging the genus *Campanula* and other material from Europe and the Orient.

Mrs. Clement Reid and Miss M. E. J. Chandler paid their customary visits several times during the year, continuing their investigations on fruits and seeds from the Oligocene and Eocene beds on the Isle of Sheppey. Amongst workers on the lower Cryptogams frequent visits were paid by Mr. H. N. Dixon (Mosses), Mr. R. Paulson (Lichens), and Mr. W. B. Grove, who spent a month at Kew in September studying Fungi.

Several botanists from the Continent stayed at Kew for longer or shorter periods during the year. The late Herr W. Becker, of Kirchmoser (Havel), spent ten days at Kew in the spring working on the Violaceae, and subsequently borrowed a large number of sheets, most of which he returned before his unexpected death in October. Mr. C. Cyrach Larsen, of the Forest Botanical School, Charlottenlund, Denmark, who was at Kew for about six months studying silviculture, spent a considerable amount of time in the Library, especially with reference to literature on *Larix* and the Douglas Fir. Dr. A. Becherer, of the Botanisches Institut, Basel, stayed at Kew from April to October studying Rhamnaceae and various matters connected with nomenclature and Systematic Botany. Professor Handel-Mazzetti, of Vienna, was at Kew for about ten days during June, working chiefly at critical material collected by him in south-west China. Of visitors from Holland, Dr. W. H. Goddyn, of Leiden, and Dr. J. P. Lotsy paid short visits, in the spring and autumn respectively, with regard to the occurrence of natural hybrids in S. Africa and elsewhere. Miss M. C. Karsten, of Terborg, Gelderland, again worked in the Herbarium for about a month on various groups of succulents, and Miss M. J. A. Faber, of Gorssel, for a shorter period studying literature on garden planning and

design. Dr. H. Wolff, of Berlin, paid a short visit in late summer examining chiefly Indian genera of Umbelliferae. Dr. and Mrs. K. Domin, of Prague, were at work for about six weeks in the Herbarium, being largely engaged in elaborating the ferns collected by them in Dominica in 1926.

Of home workers on Asiatic Botany mention should be made of Mr. H. N. Ridley, to whom Kew is indebted for information on various matters concerning the Malayan flora, and of Mr. I. H. Burkill and Dr. D. Hooper, late Curator of the India Museum, Calcutta, who continued their work on the "Dictionary of Economic Products of the Malay Peninsula." As in previous years, Mr. Burkill kindly named all the specimens of *Dioscorea* received for determination. Mr. W. R. Price paid repeated visits in connection with plants collected by him in Formosa. Professor W. G. Craib spent about six weeks at Kew during the summer vacation working on the flora of Siam, studying particularly the groups of families from Rosaceae to Alangiaceae. Part 3 of vol. i of his "Florae Siamensis Enumeratio" containing the Families Connaraceae and Leguminosae, published at Bangkok, was issued in September, 1928. Dr. Eryl Smith visited the Herbarium frequently to name her collection of ferns from Siam and the neighbouring islands. Dr. J. M. Cowan was at Kew as a volunteer for some months previous to his appointment as a temporary Botanist. Miss Muriel M. Whiting again generously gave her services for a large part of the year, assisting in the re-arrangement of the Malay and Indian material in the Herbarium.

Mr. C. E. Parkinson, Forest Botanist, Burma, spent three months at the Herbarium before his return from leave in April. Dr. F. W. Foxworthy, of the Malay Forest Service, stayed a short time at Kew in March on his way to the United States, and Mr. E. J. Strugnell, of the same service, spent several weeks in the Herbarium during the summer, working on Dipterocarpaceae.

Japan was represented by Dr. T. Tanaka, who during his stay in England paid at intervals many visits to the Herbarium, examining the Kew material of *Citrus*, and Dr. T. Yabe, who spent a short time studying chiefly the genus *Brassica*. Dr. Franklin P. Metcalf, Professor of Botany at the Fukien Christian College, Foochow, China, spent three days at Kew in the late autumn on his way to the Arnold Arboretum, verifying the records of Fukien plants.

As usual, the largest number of visitors from abroad was from the various Colonies and Dependencies in Africa. Sir Ofori Atta, Chief of Akim-Abuakwa, who is deeply interested in the botany of the Gold Coast Colony, paid a visit to the Gardens and Herbarium in June. Professor R. H. Compton, Director of the National Botanic Garden, Kirstenbosch, paid several visits to the Herbarium in January, studying chiefly the Compositae of the Cape Peninsula. Dr. G. B. Wallace, Mycologist to the Department of Agriculture, Tanganyika, spent a considerable time in the Library before his

return from leave in February. Mr. R. E. Massey continued work on the grasses of the Sudan. Major Guy Aylmer, Deputy Conservator of Forests, Sudan, and Messrs. F. R. Irvine (Achimota College, Accra), T. H. Marshall (Tanganyika), F. W. Hall (Uganda), all spent a certain amount of their leave in working out the collections they had sent or brought home. Mr. J. D. Snowden (Uganda) was at Kew for about six months of his leave working almost exclusively on the grasses of Uganda. Mr. B. D. Burt, of the Game Preservation Department, Tanganyika, who brought home nearly 10,000 sheets of Tanganyika material, was three months in the Herbarium assisting in naming the specimens. Several forestry officers, on leave from West Africa after their course of forest botany at the Imperial Forestry School at Oxford, spent a few weeks in the Herbarium working under Dr. J. Burt Davy and Mr. E. E. Kirby. Mr. N. Douglas Simpson, of the Cotton Research Board, Giza, brought home an interesting collection from Lower Egypt and was at Kew about two weeks during August. Mr. P. J. Greenway, of the Imperial Forestry School, was several weeks at the Herbarium before taking up his post as Botanist at the East African Agricultural Research Station at Amani, and Mr. H. Bruins-Lich spent some time studying various aspects of the African flora before his departure to take up his duties as Horticultural Officer, St. Helena. Throughout the year Mr. N. E. Brown was a frequent visitor, working chiefly at South African Mesembryanthemums and various genera of Iridaceae.

Turning to America, British Guiana claimed a large share of attention. Mr. L. S. Hohenkerk (Forest Officer) and Mr. R. A. Altson (lately Government Botanist) paid numerous visits with regard to collections sent home by them. Dr. H. A. Gleason was at Kew for about six months engaged on a study of the flora of the same country. During the course of his visit Dr. Gleason was able to complete the MS. of the Monocotyledons of the proposed Flora with the exception of those families which are being dealt with by other American botanists. As in previous years, Professor A. H. R. Buller (Winnipeg) spent a very large part of his vacation at Kew, being engaged on preparing the MS. of vol. iv. of his important "Researches on Fungi."

Dr. and Mrs. Carl Epling, who came to Kew in 1927, remained in Europe until the middle of August and, with the exception of a three months' visit to the Continent, spent most of their time in the Herbarium continuing their work on the revision of the American Labiatae. Dr. H. M. Hall was in England during September and rendered valuable assistance in naming and arranging the genera *Haplopappus* and *Chrysothamnus* in accordance with his monograph. During his stay in England Dr. W. R. Maxon (U.S. National Museum) paid several visits to the Herbarium, studying material of Jamaica ferns as represented at Kew. He also examined the ferns of the Lehmann collection housed in the Store, and with his invaluable help

a commencement was made with the naming and sorting out of the material of this very extensive collection prior to distribution. Professor S. J. Record (Yale University), Professor W. A. Cannon (Stanford University), Professor B. L. Robinson (Harvard), and Mr. A. W. Rehder (Arnold Arboretum), also visited Kew during the summer.

ADDITIONS TO HERBARIUM.—The total number of specimens received during 1928 was about 38,636, of which 2,331 were purchased. The chief sources from which they were obtained were as follows :—

EUROPE.—*Presented* : Great Britain, by Messrs. E. M. Marsden-Jones, V. S. Summerhayes, A. R. Horwood, Dr. W. B. Turrill, the Watson Exchange Club (per Mr. W. E. Lousley), Col. H. H. Johnston, Mrs. L. A. M. Riley (herbarium of the late Mr. L. A. M. Riley), Dr. J. Burt Davy (mosses), Messrs. Edgar Thurston, W. R. Price, J. E. Little, Col. R. Raynsford, Mrs. K. M. Reynolds, Dr. A. W. Hill ; Spain, by Mr. C. C. Lacaita, Rev. E. Ellman and Mr. N. Y. Sandwith (coll. Rev. E. Ellman and Mr. N. Y. Sandwith) ; France, by Dr. J. Burt Davy ; Denmark, by Dr. C. Christensen (algae, coll. Prof. Kolderup) ; Hungary, Flora Hungarica, Cent. 8, by the Section of Botany of the National Museum of Hungary, per Dr. Filarszky ; Czechoslovakia, by Brno University (coll. Dr. J. Podpěra) ; Caucasus, by Dr. Woronoff.

Purchased : Mr. W. R. Sherrin, European and American Sphagnaceae ; Dr. F. Petrak, Mycotheca Generalis cent. 1.

ORIENT.—*Presented* : Macedonia, by Prof. Kosanin ; Palestine, by Department of Agriculture, Palestine ; Persia, by Mr. H. G. Chick and Mr. Hugh Macmillan ; various, by Miss M. E. Edmonds.

Purchased : Prof. H. Handel-Mazzetti, "Olympus collection" from Thessalian Greece.

NORTH ASIA.—*Presented* : Mongolia, by the University of California, Berkeley, per Dean E. D. Merrill (coll. Mr. Chaney).

CHINA AND JAPAN.—*Presented* : by the Royal Botanic Garden, Edinburgh (coll. Messrs. G. Forrest and R. Farrer), Nanking University, per Mr. C. C. Ching (coll. Mr. C. L. Tso), Mrs. E. C. Teichman, Prof. H. Handel-Mazzetti, the Arnold Arboretum (coll. Mr. C. C. Ching), the Government Research Institute, Formosa, per Mr. R. Kanehira (coll. Mr. S. Sasaki and others), and by Fleet-Surgeon C. G. Matthew, R.N.

INDIA AND CEYLON.—*Presented* : Assam, by Mrs. A. D. Parry, Capt. F. Kingdon Ward, and Miss E. J. Riddell (coll. Mr. Riddell) ; various, by the Agricultural College, Coimbatore, the Royal Botanic Gardens, Calcutta, Col. H. H. Rich, and Mr. H. H. Haines (the Haines Herbarium) ; Kashmir, by Prof. R. R. Stewart and Mr. B. B. Osmaston ; South Lushai, by Rev.

W. J. L. Wenger ; Nepal (communicated by Col. Sir Clive Wigram), by the Royal Botanic Garden, Edinburgh ; Ceylon, by the Department of Agriculture, Peradeniya (coll. Mr. A. H. G. Alston).

MALAY PENINSULA.—*Presented* : various, by the Director, Botanic Gardens, Singapore, and the Forest Service Department, Kuala Lumpur.

INDO-CHINA.—*Presented* : Siam, by Mrs. D. J. Collins and Dr. A. F. G. Kerr (coll. Dr. A. F. G. Kerr, Noi Put and M. C. Lakshnakara).

MALAY ISLANDS.—*Presented* : Java and North Borneo, by the Director, Botanic Gardens, Buitenzorg ; Philippine Islands, by the University of California, Berkeley, and Mr. E. B. Copeland (Pteridophyta Philippinensia Exsiccata, Cent. i) ; Solomon Islands, by Mr. J. H. L. Waterhouse ; various, by Fleet-Surgeon C. G. Matthew, R.N.

Purchased : Mr. C. A. Wenzel, Philippine Islands.

NEW GUINEA.—*Presented* : by Mr. A. Wade.

POLYNESIA.—*Presented* : Fiji, by Mrs. J. D. Tothill.

AUSTRALIA.—*Presented* : New South Wales, by Dr. F. A. Rodway and by the Director, Botanic Gardens, Sydney ; South Australia, by Mr. J. M. Black, Mrs. Holdaway, and Dr. A. W. Hill (lichens from Koonamore Vegetation Reserve) ; North Australia, by Mr. C. E. F. Allen ; Central Australia, by Mr. H. Basedow (coll. Mackay Expedition) ; Western Australia, by Mrs. M. B. Wilkinson (coll. Mrs. Bunbury) ; Victoria, by the Director, National Herbarium, South Yarra ; Queensland, by Mr. C. T. White, Government Botanist.

TASMANIA.—*Presented* : by Mr. A. V. Giblin.

NEW ZEALAND.—*Presented* : by Dr. L. Cockayne (Wellington), Dr. H. H. Allan (Palmerston North), and Mr. H. Carse (Auckland).

TROPICAL AFRICA.—*Presented* : Nigeria, by Mr. Ivan D. Hepburn, and the Botanic Gardens, Victoria, Cameroons (coll. Mr. T. D. Maitland) ; Sierra Leone, by the Lands and Forests Department (coll. Mr. F. C. Deighton) ; Gambia, by the Department of Agriculture (coll. Mr. T. R. Hayes) ; Gold Coast, by Sir A. Kitson, Mr. T. Lloyd Williams, Mr. F. R. Irvine, Mr. W. C. Fishlock, and by the Forestry Department (coll. Mr. C. Vigne) ; Sudan, by the Department of Agriculture (coll. Major G. Aylmer, Major F. E. Kenchington and Mr. M. A. Bailey) ; North East Tropical Africa, by Lady Maffey ; Uganda, by the Department of Agriculture (coll. Messrs. J. D. Snowden and C. G. Hansford) ; Tanganyika Territory, by the Department of Agriculture (coll. Messrs. A. E. Haarer, T. H. Marshall and H. Wolfe), and by the East African Agricultural

Research Station, Amani (coll. Mr. P. J. Greenway); Kenya, by Scott Agricultural Laboratories, Department of Agriculture (coll. Messrs. J. McDonald and W. Lyne Watt), and by the Forestry Department (coll. Mr. H. M. Gardner); Rhodesia, by the Department of Agriculture (coll. Mr. F. Eyles).

Purchased: Mr. F. W. H. Migeod, Nigeria.

MASCARENE ISLANDS.—*Presented*: Mauritius, by Mr. R. E. Vaughan; Madagascar, by Monsieur H. Perrier de la Bathie.

SOUTH AFRICA.—*Presented*: Cape Province, by Mr. N. S. Pillans, the Hon. Mrs. Ryder, Dr. J. Burt Davy, the Albany Museum, Grahamstown, and the Division of Botany, Pretoria.

NORTH AMERICA.—*Presented*: Greenland (coll. Oxford University Greenland Expedition), per Mr. C. G. Trapnell; Canada, by Department of Agriculture, Ottawa (seeds), Prof. R. R. Gates and Mr. K. Mellanby (coll. Prof. R. R. Gates and Mr. K. Mellanby); United States, by Yale University, University of California, Los Angeles (photographs, per Dr. Epling), Miss Alice Eastwood (coll. Dr. Ivan M. Johnston), and by Dr. H. M. Hall (photographs).

Purchased: Mr. W. N. Suksdorf, "Washington's Flora," Fascicle xiii.; Mr. B. F. Bush, Missouri plants.

CENTRAL AMERICA.—*Presented*: British Honduras, by Mr. H. C. Sampson; Honduras, by the Rev. Garnet S. Kenyon; various, by University of Texas, per Mr. E. R. Bogusch.

WEST INDIES.—*Presented*: Trinidad, by the Department of Agriculture (coll. Mr. R. O. Williams), and by Mr. W. E. Broadway.

Purchased: Mr. W. E. Broadway, Trinidad plants.

EAST TROPICAL SOUTH AMERICA.—*Presented*: Brazil, by Mr. B. G. C. Bolland.

WEST TROPICAL SOUTH AMERICA.—*Presented*: Ecuador, by Major R. H. Thomas.

Purchased: The Berlin Botanic Gardens, Bolivia (coll. Mr. José Steinbach); Dr. O. Buchtien, Herbarium Bolivianum, cents. 6 and 7.

TEMPERATE SOUTH AMERICA.—*Presented*: Argentine, by Dr. E. Werdermann (seeds, coll. Dr. Schreiter).

DISTRIBUTION OF DUPLICATES.—The following were the principal institutions to which duplicates were distributed:—

Great Britain and Ireland.—Aberdeen, Cruickshank Botanic Gardens; Cardiff, National Museum of Wales; Dublin, Trinity College, Botanical School; Edinburgh, Royal Botanic Garden; London, British Museum (Natural History) and South London Botanical Museum; Manchester, The University, Botany Department.

Europe.—Belgrade, Botanic Gardens ; Berlin, Botanic Gardens and Museums ; Brno, Masaryk University ; Budapest, National Museum ; Copenhagen, Botanic Institute ; Leiden, 's Rijks Herbarium ; Leningrad, Principal Botanic Garden ; Sarajevo, National Museum ; Sofia, Natural History Museum, the Natural History Museum of the King of Bulgaria, and the University, Department of Botany ; Stockholm, Riksmuseet ; Uppsala, Botanic Museum ; Zürich, Botanic Museum and Garden.

Asia.—Nanking, National South-Eastern University.

Africa.—Cape Town, Bolus Herbarium ; Pretoria, Division of Botany.

Australasia.—Palmerston, Department of Agriculture ; Wellington, Dominion Museum.

America.—University of California, Berkeley and Los Angeles ; Chicago, Field Museum ; Harvard University, Gray Herbarium and Arnold Arboretum ; New York, Botanical Garden ; Philadelphia, Academy of Natural Sciences ; San Francisco, Academy of Natural Sciences ; University of Texas ; Washington, D. C., U.S. National Museum.

The Library.

The following remarks refer to the more important additions received as presentations during the year.

The Bentham Trustees have made several presentations, including :—A. Dietrich, *Flora Regni Borussici*, 1833-44, 12 vols., containing 864 coloured plates ; C. G. Lorek, *Flora Prussica*, ed. 3, 1848 ; H. W. Wollenweber, *Fusaria autographice delineata*, ed. 2, 1926, 659 sheets ; and C. A. M. Lindman, *Bilder ur Nordens Flora*, 1922-26, in 3 vols., containing 663 coloured plates. The last named is a new edition of *Svensk Botanik*, begun early last century and published under the editorship of J. W. Palmstruck and others. The excellent plates in that work have been used again—the figures, slightly altered as to arrangement and analyses, have been classified, and provided with new text by the late Prof. Lindman. Valuable help in securing a copy of the work was afforded by the Misses Elisabet and Ester Björklund of Stockholm. Several periodicals, received in exchange for *Hooker's Icones Plantarum*, have also been presented by the Bentham Trustees.

Sir William Thiselton-Dyer a few months before his death made what proved to be his final contribution to the library. This included J. A. Voelcker's *Report on the Improvement of Indian Agriculture*, 1894 ; *Indian Industrial Commission*, 1916-18, *Report* ; *Leopoldina*, Bd. 1 and 2, and miscellaneous figures of plants, a few of them original. In addition to these he sent the chronometer case which was used by Sir J. D. Hooker on the Antarctic Voyage of the "Erebus" as a gift from Lady Thiselton-Dyer.

Lieut.-Col. Sir David Prain has presented the continuation of several periodicals, amongst which are the *Berichte der Deutschen Botanischen Gesellschaft*, *Bulletin de la Société Botanique de France*,

Proceedings of the American Philosophical Society, and the *Yearbook of Pharmacy . . . and Transactions of the British Pharmaceutical Conference*, 1927.

The Secretary of State for India has presented two copies of the *Flora of the Presidency of Madras*, part 8, containing the families *Ulmaceae* to *Xyridaceae*, by C. E. C. Fischer. It is expected that two more parts will complete the work.

From the Crown Agents for the Colonies have been received six copies of the second part of the *Flora of West Tropical Africa*, by J. Hutchinson and J. M. Dalziel, and publications of the Geological Survey of Nigeria.

The library is indebted to Mrs. Frank Bolus for volume 5 of *Nature Notes*, edited by S. H. Skaife, and *Notes on Mesembrianthemum and some allied genera*, part 1, a volume of 156 pages, with numerous coloured plates and other illustrations, and the first sheet of part 2. These notes have mostly been reprinted from *South African Gardening and Country Life*.

The Carnegie Institution of Washington has presented *The genus Haplopappus: a phylogenetic study in the Compositae* (Publication No. 38), by H. M. Hall, and 12 coloured plates from H. S. Conard's *The Waterlilies* (Publication No. 4). *A Report on American museum work*, by E. E. Lowe, and *A Report on the public museums of the British Isles . . .*, by Sir H. Miers, have been received from the Carnegie United Kingdom Trustees.

Prof. Karel Domin of the Charles University, Prague, has contributed a number of his own publications and has obtained for the library several Czechoslovakian works by other authors. Among the former are: *Vergleichende Studien über den Fichtenspargel*, 1915; *New additions to the Flora of Western Australia*, 1923; and an illustrated *Flora of Czechoslovakia*, by him and Dr. J. Podpěra, published in 1928. This is in Czech and is a second edition of F. Polivka's *Flora of the Crown Land of Bohemia*. Other publications received from Prof. Domin are:—*Die Vegetationsverhältnisse im Gebiete des mährischen Karstes*, by J. Podpěra; *Sylviculture dans la République Tchèqueoslovaque*, 1926 (no. 66 of the Publications of the Ministry of Agriculture of Czechoslovakia); *Acta Botanica Bohemica*, edited by K. Domin and J. Podpěra, vols. iv-vii; *Preslia* (*Reports of the Czechoslovak Botanical Society*), i, vi, and vii; and *Reliquiae Mrkvíčkanæ*, 1922, by J. Velenovský. A collection of the plates from the first volume of Prof. Domin's *Travels in the West Indies* has been received through Dr. A. W. Hill.

A copy of the *Proceedings and Resolutions*, etc., of the Second British Empire Forestry Conference, Canada, 1923, published at Ottawa in 1927, has been received from the Forestry Commission, and *Abstracts of Papers on Agricultural Research in Great Britain and Northern Ireland*, October, 1926, to September, 1927, has been received from the Secretary to the Imperial Agricultural Research Conference, 1927. The Empire Marketing Board and the Empire

Cotton Growing Corporation have presented selections of the publications issued by them during the year.

The Departement van Landbouw, Nijverheid en Handel in Nederlandsch-Indië has continued to present the publications of its various sections and has supplied a number of the issues of previous years which were required to complete sets. Several *Mededeelingen* have been received from the Kina-Proefstation and from the Proefstation voor Thee, and a number from the Algemeen Proefstation der A.V.R.O.S., Medan, Sumatra.

Books received from the Editor of *Nature*:—L. Burbank and W. Hall, *The Harvest of the years*; R. M. Laing and E. W. Blackwell, *Plants of New Zealand*, ed. 3; G. P. Majumdar, *Vanaspati: plants and plant-life as in Indian treatises and traditions*; F. Ramaley, *Colorado plant life*; H. Wolff, *Umbelliferae-Apioideae-Asminaceae-Carinales*, etc., in Engler's *Das Pflanzenreich*; all published in 1927; also several small works on gardening.

Books received from their publishers for review:—from Messrs. Arnold: Sir Arthur F. Hort, *The unconventional garden*; from Messrs. Macmillan: C. F. Greeves-Carpenter, *The care of ornamental trees*; from the Nasionale Pers Beperk, Cape Town: P. A. van der Bijl, *Plantsiektes; hul oorsaak en bestryding*; from The Sheldon Press: Ellison Hawks, *Pioneers of plant study*; from Messrs. Whitcombe and Tombs: H. H. Allan, *New Zealand trees and shrubs and how to identify them*.

The following are independent works or in some cases separates from periodicals or other publications which have been presented by their authors unless otherwise stated:—G. P. Ahern and Helen K. Newton, *Bibliography on woods of the world* (Tropical Plant Research Foundation, Washington; Scientific Contributions, no. 10); D. Atanasoff, *Ergot of grains and grasses*, 1920, published by the U. S. Department of Agriculture, Office of Cereal Investigations (from Mr. A. D. Cotton); R. Block, *Catalogue of a private collection of walking sticks*; British Association, Glasgow Meeting, 1928: *General Handbook and Handbooks for Excursions* (from Dr. W. B. Turrill); E. J. Butler, *Report on some diseases of tea and tobacco in Nyasaland*, published by the Department of Agriculture, Nyasaland; H. F. Comber, *Andes Expeditions*, 1925-6 and 1926-7: *Field notes of plants collected*, 2 copies (from the Hon. H. D. McLaren); M. T. Cook and H. A. Gleason, *Ecological survey of the Flora of Porto Rico* in *Journ. Dep. Agric. Porto Rico*, xii, nos. 1 and 2; B. O. Coventry, *Wild Flowers of Kashmir*, series 2, 1927; W. G. Craib, *Florae Siamensis enumeratio*, vol. i, pt. 3 (from the Siam Society, Bangkok); G. Delevoy, *Études systématiques des bois du Katanga*, fasc. 1-3 (from the Comité Spécial du Katanga); R. E. Dengler, *Theophrastus, De causis plantarum* (a thesis in Greek), 1927; É. De Wildeman, *Plantae Bequaertianae*, vol. iv, fasc. 3, and *Contribution à l'étude de la Flore du Katanga*, suppl. 1, 1927 (the latter from the Comité Spécial du Katanga); G. Claridge Druce, *British plant list*, ed. 2; B.

Fedtschenko (Editor), *Flora Rossiae austro-orientalis*, fasc. 1, 1927 ; V. N. Gauntlett and Co., *Hardy plants worth growing* (an illustrated catalogue) ; J. W. Gregor, *Pollination and seed production in the rye grasses*, in *Trans. R. Soc. Edinb.* lv, pt. 3 ; H. T. Güssow and W. S. Odell, *Mushrooms and toadstools*, 1927 (from Dr. A. W. Hill) ; G. W. G. Gunawardana (Editor), *Dravya Guna Nighantuwa and Auwasadha Nama Akaradiya, or an illustrated encyclopaedia of tropical plants and drugs, mentioned in Ayurvedic medical science, etc.*, ed. 1, pt. 1, vol. i, 1912, in Singhalese (from Mr. F. A. Stockdale) ; J. W. Harshberger, *The Life and work of . . . : an autobiography* ; H. Hermannsson, *Sir Joseph Banks and Iceland*, in *Islandica*, vol. xviii ; A. Hombersley, *Some Trinidad ferns : an amateur's list*, 1927 (typescript) ; H. H. Hu and W. Y. Chun (Editors), *Icones plantarum Sinicarum*, fasc. 1, 1927 (from the University Library, National Fourth Chun San University, Nanking) ; E. Hultén, *Flora of Kamtschatka and the adjacent islands*, ii, in *Kgl. Svenska Vet.-Akad. Handl.* 3, v, no. 2 ; H. H. Janssonius, *Mikrographie des Holzes der auf Java vorkommenden Baumarten*, Lfg. 9 ; A. C. Kingsford and M. K. Bamber, *Report on the tea industries of Java, Formosa and Japan*, 1907 (from Director of Agriculture, Ceylon) ; V. Komarov, *Flora Peninsulae Kamtschatka*, i (from Academy of Sciences, Leningrad) ; W. Limpricht, *Taccaceae*, in Engler's *Das Pflanzenreich* ; J. Lothian, *Practical hints on the culture and general management of alpine or rock plants*, [1845] (from Mr. T. Hay) ; J. H. Maiden, *A critical revision of the genus Eucalyptus*, pt. 69 (from Director, Botanic Gardens, Sydney) ; H. B. May, *Seventy years in horticulture* (2 copies) ; F. Menéndez, *Catálogo de las plantas existentes en el Jardín de Aclimatación de La Orotava (Canarias)*, 1923 (from Mr. H. Spooner) ; K. Miyabe and Y. Kudo, *Icones of the essential forest trees of Hokkaido*, vol. ii, fasc. 15-19, 1927-28 (from Governor of the Hokkaido Government) ; *North American Flora*, vol. 23, pts. 1-2 (from Dr. N. L. Britton) ; Janet Perkins, *Uebersicht über die Gattungen der Styracaceae, etc.* ; W. Pieper, *Vorarbeiten zu einer Revision der afrikanischen Vitex- Arten, etc.*, in *Engl. Bot. Jahrb.* lxii ; O. Postumus, *The ferns of Surinam and of French and British Guiana* ; Anne Pratt, *The flowering plants, grasses, sedges and ferns of Great Britain*, 1891, 4 vols. (from Mr. H. Hamel Smith) ; L. Reychler, *Mutants with orchids : results obtained by crossings with mutants of Cattleya* ; W. Robyns, *Tentamen monographiae Vangueriae generumque affinium*, in *Bull. Jard. Bot. Brux.* vol. xi ; L. Kolderup Rosenvinge and E. Warming (Editors), *The botany of Iceland*, vol. ii, pt. 2 ; E. R. Sawyer, *Cedara Memoirs of South African Agriculture*, vol. iii, 1912 (from Principal, School of Agriculture, Cedara, Natal) ; J. H. Simmonds, *Trees from other lands for shelter and timber in New Zealand : Eucalypts* ; C. Skottsberg (Editor), *The natural history of Juan Fernandez and Easter Island*, vol. ii, pt. 4 ; Huron H. Smith, *Ethnobotany of the Meskwaki Indians*, in *Bull. Public Mus. Milwaukee*, iv (from Mr. T. A. Sprague) ; R. G. Stapledon, *A tour in*

Australia and New Zealand: grass land and other studies (from Dr. A. W. Hill); V. V. Talanov, *The regions of the best varieties of spring and winter wheats of U.S.S.R.*; C. L. Thays, *El Jardin Botanico . . . de Buenos Aires*; A. Usteri, *Die Pflanzen-Sammlung*, 2. Auflage, 1926 (from Prof. Margaret Barclay Wilson); R. O. Williams and E. E. Cheesman, *Flora of Trinidad and Tobago*, vol. i, pt. 1 and vol. ii, pt. 1, 2 copies (from Director of Agriculture, Trinidad and Tobago, and Secretary of State for the Colonies); L. Wittmack, *Botanik und Kultur der Baumwolle*; E. W. Wulff, *Flora Taurica*, vol. i, fasc. 1, 1927 (from the Nikita Botanic Garden, Yalta, Crimea); Y. Yabe, (1) *An enumeration of plants hitherto known from South Manchuria*, 1912; (2) *Icones Florae Manchuricae*, vol. i, pts. 1 and 2, 1914 and 1920; (3) *A preliminary report on the Flora of the Tsing-Tau region*, 1917; P. M. Zhukovsky, *A critical-systematical survey of the species of the genus Aegilops L.* The year of publication when not stated is 1928.

The periodical and serial publications presented during the year include the following, which have been received from their editors or from the societies or institutions issuing them, unless otherwise stated:—*Acta Horti Botanici Universitatis Latviensis*, vol. ii, nos. 2-3; *Acta Horti Gothoburgensis*, vol. iii; *Acta Phytochimica* (Tokyo), vol. iv, no. 1; *Agricultural Journal of British Guiana*, vol. i, nos. 1-2; *The American Orchid Society Year Book*, 1927; *Annals of the Royal Botanic Gardens, Peradeniya*, vol. vi, pt. 1 (3 copies); *Annuario do Ministerio da Agricultura, Industria e Commercio* (Rio de Janeiro), 1928 (from Mr. E. Teixeira); *Archives de l'Institut Botanique de l'Université de Liège*, vols. v and vi, 1914-27; *Australasian Association for the Advancement of Science, Report of the 18th meeting*, 1926; *Boyce Thompson Institute for Plant Research* (Yonkers, New York), *Contributions*, vol. i, nos. 5-6, and *Professional Papers*, nos. 7-9; *British Fern Gazette*, vol. v, nos. 8-10 (from Mr. C. H. Wright); *Bulletin de l'Institut et du Jardin Botaniques de l'Université de Belgrade*, vol. i, no. 1; *Bulletin du Jardin Botanique de Kieff*, nos. vii-viii; *Bulletin of the Madras Government Museum*, new series, Natural History Section, vol. i, no. 1; *Bulletin of the Rubber Growers' Association*, vol. 10; *Bulletin de la Société Botanique de Bulgarie*, vol. ii; *Bulletin de la Société Botanique de Genève*, vol. xix, fasc. 2, and vol. xx, fasc. 1; *Bulletin de la Société Linnéenne de Lyon*, 7me année (from Dr. A. W. Hill); *Bulletin de la Société Royale de Botanique de Belgique*, vol. lx; *Contributions du Laboratoire de Botanique de l'Université de Montreal*, nos. 9-10; *The Empire Cotton Growing Review*, vol. v; *Erdészeti Kísérletek* (Forest Researches, Sopron, Hungary), vol. xxix, fasc. 3-4, and vol. xxx, fasc. 1-3; *Folia Cryptogamica* (Szeged, Hungary), vol. i, no. 6; *Forestry: the Journal of the Society of Foresters of Great Britain*, vol. ii, no. 1; *Harvard Botanical Gardens, Cienfuegos, Cuba, Report*, 1900-1926; *The Indian Forester*, 1928; *Japanese Journal of Botany*, vol. iii, no. 4, and vol. iv, nos. 1-2; *Journal of the Faculty of Science*,

Imperial University of Tokyo, sect. iii, Botany, vol. i, pt. 4 ; *Journal of the Federated Malay States Museums*, vol. xiv, pts. 1-2 ; *Journal of the Gold Coast Agricultural and Commercial Society*, vol. vi, nos. 2-3 ; *Long Ashton, Bristol, Agricultural and Horticultural Research Station, Annual Report*, 1927 ; *Malayan Forest Records*, no. 5 (contains *Malayan plant names*, compiled by J. G. Watson) ; *Malpighia*, anno xxx, containing *Studio monografico sulle specie Americane del gen. Saurauia Willd.* (continuation), by L. Buscalioni and G. Muscatello ; *Mededeelingen van het Phytopathologisch Laboratorium "Willie Commelin Scholten,"* xii ; *Memoir of Tanaka Citrus Experiment Station* (Fukuoka, Japan), vol. i, no. 1 ; *Memoirs of the College of Agriculture, Kyoto Imperial University*, no. 3 ; *Memoirs of the Cotton Research Station, Trinidad*, ser. B (Physiology), no. 1, containing *Studies on the transport of carbohydrates in the Cotton plant*, by T. G. Mason and E. J. Maskell, reprinted from *Ann. Bot.* xlii (from the Empire Cotton Growing Corporation) ; *Natural History Magazine*, vol. i, nos. 5-8 (from the Trustees of the British Museum) ; *New Zealand State Forest Service, Annual Report of the Director of Forestry for the year ended 31st March, 1928* ; *Notes from the Royal Botanic Garden, Edinburgh*, nos. 75-76 ; *Notulae Systematicae* (Herbier du Muséum de Paris, Phanérogamie), tome iv, nos. 4-5 ; *Orchid Review*, 1928 ; *Proceedings of the Imperial Academy* (Japan), vol. iv, nos. 1-9 ; *Quarterly Journal of Forestry*, vol. xxii ; *Report of the Marlborough College Natural History Society*, 1927 ; *Reports of the National Step Reservation "Chapli,"* 1924 and 1928, vols. 3-4 (in Russian) ; *The Rhododendron Society Notes*, vol. iii, nos. 1-3 ; *I Rocznik Polskiego Towarzystwa Dendrologicznego (Annales de la Société Dendrologique de Pologne)*, ii ; *Science Reports of the Tohoku Imperial University* (Sendai, Japan), ser. 2, vol. x, no. 4, and ser. 4, vol. iii, no. 3, fasc. 1-2 ; *Studia Citologica*, edited by the Tanaka Citrus Experiment Station, Fukuoka, Japan, vol. i, nos. 1-2 ; *The Tea Quarterly (Journal of the Tea Research Institute of Ceylon)*, vol. i ; *Te Kura Ngahere (The Sacred Lore of the Forest)*, published by the Forestry Club of the Canterbury (New Zealand) College School of Forestry, vol. ii, no. 3 ; *Tottori Nogaku-Kwaiho (Transactions of the Tottori Society of Agricultural Science, Japan)*, vol. i, no. 1 ; *Trabajos del Museo Comercial de Venezuela*, ii-iv ; *Transactions of the Royal Society of Canada*, sect. v (Biological Sciences), 1927 ; *Transactions of Tomsk State University*, vol. 79, fasc. 1-4 ; *Travaux des Laboratoires de Matière Médicale et de Pharmacie Galénique de la Faculté de Pharmacie de Paris*, tome xviii (from Prof. Ém. Perrot) ; *Tropical Woods* (Yale University School of Forestry), nos. 13-16 ; *The Ukrainian Botanical Review*, vol. iii ; *Union of South Africa, Department of Agriculture, Veterinary Education and Research, Reports* 13 and 14, pts. 1 and 2 and Supplement to pt. 2 ; *University of California Publications in Botany*, vol. xiv, nos. 3-8 ; *University of Colorado Studies*, vol. xvi, nos. 2-3 ; *Watson Botanical Exchange Club, Annual Report*, 1927-28 ; *Welsh Plant Breeding*

Station, Bulletin, ser. H, no. 8; *West of Scotland Agricultural College, Department of Plant Husbandry, Research Bulletin*, no. 1; *Year Book of the Public Museum of the City of Milwaukee*, 1927 (from Mr. T. A. Sprague); *The Yellow Dragon* (Queen's College, Hong Kong), vol. xxviii, nos. 11-12, and vol. xxix, nos. 1-11, containing articles on the flora of Hong Kong.

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Agricultural Officer—W. O'B. Donovan.

St. Lucia.—Agricultural Department.—

Superintendent—E. A. Walters*. *Assistant Agricultural Superintendent*—R. W. Niles.

St. Vincent. Agricultural Department.—

Superintendent—T. Jackson*.

WESTERN PACIFIC.**Tonga Islands.—**

Department of Agriculture.—

Director—H. P. Ritchie.

ZANZIBAR.**Agricultural Department—**

Director and Government Chemist—V. H. Kirkham, B.Sc. *Assistant Director*—H. Waterland. *Manager of Plantations*—G. Tomson. *Agricultural Officers*—J. E. Baker, J. R. P. Soper, B.A., T. D. Rutter, B.Sc.

INDIA AND BURMA.**Government of India.†****Botanical Survey, Calcutta.—**

Director—C. C. Calder, B.Sc., B.Sc.(Agric.), F.L.S. *Curator, Industrial Section*—S. N. Bal, M.Sc., Ph.C., F.L.S. *Systematic Assistant*—T. D. Srinivasan, M.A.

Forest Department.—

Inspector-General and President, Forest Research Institute and College, Dehra Dun—A. Rodger, O.B.E., F.L.S. *Botanist*—R. N. Parker.

Department of Agriculture.—**Imperial Institute of Agricultural Research, Pusa.—**

Agricultural Adviser to Government of India and Director—W. McRae, M.A., D.Sc., F.L.S. (offg.). *Economic Botanist*—F. J. F. Shaw, D.Sc., A.R.C.S., F.L.S. *Mycologist*—J. F. Dastur, M.Sc., D.I.C. (offg.).

Bengal.—**Forest Department, Darjeeling.—**

Conservator—E. O. Shebbeare.

Department of Agriculture, Dacca.—

Director—R. S. Finlow, C.I.E., B.Sc. *Economic Botanist*—G. P. Hector, M.A., D.Sc.

Royal Botanic Gardens, Calcutta.—

Superintendent—C. C. Calder, B.Sc., B.Sc.(Agric.), F.L.S. *Curator of Herbarium*—K. P. Biswas, M.A. *Curator of Garden*—N. Mitra. *Assistant Curator*—M. Jones. *Assistant Curator, Calcutta Gardens*—S. N. Basu.

Agri-Horticultural Society of India, Calcutta.—

Secretary—S. Percy-Lancaster, F.L.S.

Lloyd Botanic Garden, Darjeeling.—

Superintendent—C. C. Calder, B.Sc., B.Sc.(Agric.), F.L.S. *Curator*—J. E. Leslie*.

Cinchona.—

Superintendent of Cinchona Cultivation—C. C. Calder, B.Sc., B.Sc.(Agric.), F.L.S. *Managers*—(Mungpoo) P. V. Osborne*, (Munsong) H. Thomas*. *Assistant Managers*—(Mungpoo) G. H. Fothergill, (Munsong) L. G. Richards*, P. W. Cresswell.

Government House Gardens, Darjeeling.—

Curator—J. T. Johnson*.

† Officers of the various Departments will be found under the Provinces and Administrations to which they are attached.

INDIA AND BURMA.—*contd.***Madras.**—

Forest Department, Madras.—

Chief Conservator—R. D. Richmond.

Department of Agriculture, Madras.—

Director—G. R. Hilsen, B.Sc. *Economic Botanists*—R. O. Iliffe, M.A., F.L.S. (*Paddy*), V. Ramanatha Ayyar (*Cotton*), G. N. Rangaswami Ayyangar, B.A. (*Millet*s). *Government Mycologist*—S. Sundararaman, M.A. *Systematic Botanist*—V. Narayanaswami, M.A.

Government Botanic Gardens and Parks, Ootacamund.—

Curator—F. H. Butcher*.

Agri-Horticultural Society, Madras City.—

Superintendent—G. W. Thompson.

Cinchona Department.—

Deputy Director of Agriculture, Cinchona, Ootacamund—A. Wilson, M.A., B.Sc. *Superintendents*—(*Dodabetta*)———, (*Nedivattam and Hooker*) W. H. P. Collins, (*Valparai Anamallais*) D. M. Gall.

Bombay.—

Forest Department, Poona.—

Chief Conservator—H. L. Newman.

Agricultural Department, Poona.—

Director—T. F. Main, O.B.E., B.Sc. *Economic Botanist*—W. Burns, D.Sc.

Municipal Gardens, Bombay City.—

Superintendent—D. S. Laud.

Empress Botanical Garden, Poona.—

Superintendent—N. M. Bhagawat.

Government Gardens, Poona.—

Superintendent—E. Little*.**United Provinces of Agra and Oudh.**—

Forest Department, Naini Tal.—

Chief Conservator—F. R. Channer, O.B.E.

Department of Agriculture, Lucknow.—

Director—G. Clarke, C.I.E. *Economic Botanists*—R. L. Sethi, M.Sc., B. Ram Parshad, T. S. Sabnis, M.Sc. *Plant Pathologist*—P. K. Dey, M.Sc. *Deputy Director of Gardens, Saharanpur*—W. Head* (offg.). *Superintendents of Gardens*; Agra—V. E. Morgan (offg.), Allahabad—W. S. Smith, M.C. (offg.), Saharanpur—F. H. Johnson (offg.), Kumaon—L. F. Ruse*, Lucknow—R. D. Fordham.

Punjab.—

Forest Department, Lahore.—

Chief Conservator—A. D. Blascheck.

Department of Agriculture, Lahore.—

Director—D. Milne, C.I.E., B.Sc. *Associate Professor of Botany, Agricultural College, Lyallpur*—Rai Sahib L. Jai Chand Luthra.

Delhi.—

Superintendent, Historic and other Gardens—R. H. Locke*.

Superintendent, Arboricultural Operations, New Delhi—W. R. Mustoe*.

Lahore, Government Gardens.—

Superintendent—A. Hardie*.

Simla, Mashobra, and Delhi, Viceregal Estate Gardens.—

Superintendent—E. Long*.

INDIA AND BURMA.—contd.**Bihar and Orissa.—**

Forest Department, Ranchi.—

Conservator—A. J. Gibson, F.L.S.

Agricultural Department, Sabour.—

Director—D. R. Sethi, M.A., B.Sc.

Burma.—

Forest Department, Rangoon.—

Chief Conservator—H. W. A. Watson. *Forest Botanist*—C. E. Parkinson.

Agricultural Department, Rangoon.—

Director—A. McKerral, M.A., B.Sc. *Economic Botanist*—D. Rhind, B.Sc. *Mycologist*—U. Thet Su, B.Agr., D.I.C.

Government Botanic Garden, Maymyo.—

Superintendent—C. Bogg.

Agri-Horticultural Society.—

Superintendent—C. A. Giffening.

Cinchona.—

Superintendent, Cinchona Cultivation, Burma—P. T. Russell*.

Central Provinces.—

Forest Department, Pachmarhi.—

Chief Conservator—C. A. Malcolm.

Department of Agriculture, Nagpur.—

Director—F. J. Plymen, C.I.E. *Economic Botanist for Cotton*—W. Youngman, B.Sc., Ph.D. *Mycologist*—Jeewansingh, M.Sc. *Second Economic Botanist*—D. N. Mahta, B.A., F.L.S.

Nagpur Public Gardens.—

Officer-in-Charge—D. N. Mahta, B.A., F.L.S.

Assam.—

Forest Department, Shillong.—

Chief Conservator—F. H. Cavendish.

Director of Agriculture and Industries and Registrar of Co-operative Societies—Rai Bahadur Kanak Lal Barua.

Shillong, Government Gardens.—

Superintendent—R. Badgery*.

North West Frontier Province.—

Deputy Conservator of Forests—G. R. Henniker-Gotley, D.S.O., B.A.

Agricultural Officer—W. Robertson Brown*.

Port Blair and Nicobars, Port Blair.—

Chief Forest Officer—L. Mason, O.B.E., M.C.

Indian States.—

Mysore. Bangalore.—

Director of Agriculture—Leslie C. Coleman, M.A., Ph.D. *Superintendent of Government Gardens*—H. C. Javaraya, F.L.S.

Forest Department, Bangalore.—

Chief Conservator—B. V. Ramaiengar.

Baroda.

State Gardens.—

Superintendent—T. R. Kothavala.

INDIA AND BURMA.—contd.**Kashmir and Jammu.—**

Forest Department.—

Chief Conservator—H. L. Wright, B.A.**Gwalior.—**

State Gardens.—

Director—C. M. Tembe, F.L.S.**Central India and Rajputana.—**

Indore, Institute of Plant Industry.—

Director—A. Howard, C.I.E., M.A.

Udaipur.—

Superintendent of Gardens—M. L. Bohra.**Madras.—**

Travancore, Trivandrum.—

Director of Agriculture and Fisheries—N. Kunjan Pillai, M.A.,
B.Sc., Ph.D. *Superintendent, Museum and Public Gardens*—
G. N. Tampi, B.A.